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# NOTES

ON THE

# GENUS DIOSCOREA

IN THE

# BELGIAN CONGO

BY

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This paper is intended to direct all who are able to study the Congo Dioscoreas alive to points worthy of their particular attention.

The genus is world-wide in the humid tropics and extends beyond them into countries with hot summers. It reaches for instance the Amur river in Asia and the southern border of Canada in North America, and it reaches south-eastern Australia, the 34th degree in South Africa and the Argentine in South America. This is contrived by rest during the adverse part of the year, Dioscoreas being tropophytes. All the African species are climbers. As a climber needs a woody plant on which to climb, the African species grow in association with trees or, a few, with grasses which have tall woody haulms. They belong therefore to climatic conditions whereunder trees are produced; but their habit of annually renewing their above-ground parts makes it difficult for them to persist in high forest because they cannot reach the light they require. They thrive, however, where the forest is broken and a few hold their own even in the heart of the most densely afforested country. Others in contrast thrive in scattered patches of trees in savannah.

The genus can be broken up into quite natural sections. Six of these sections occur in the Belgian Congo : *Macroura, Macrocarpaea* and *Asterotricha,* which are confined to Africa, *Opsophyton, Lasiophyton* and *Enantiophyllum,* which are common to Africa and Asia. It is well to define them.

I. — **Stems twining to the left, and capsules elongated.**

A. — **MACROURA.** *Tubers perennial,* as they grow old becoming lobed, or in Madagascar species branched : very poisonous. *Stems* unarmed, *glabrous. Leaves entire,* cordate at the base, at the apex *carrying a very large glandular acumen* developed from the forerunner tip, *opposite* in all mature plants except at the base of the stems. *Male flowers in little groups* sessile along the axis, not opening wide in anthesis. *Fertile stamens 6. Capsule large,* even up to 5 cm. in length : its *seeds* attached near the middle of the placenta and *winged at both ends.*

B. — **MACROCARPAEA.** *Tubers* not yet described, but from collectors' notes thought to be annually renewed and to penetrate into the soil, perhaps not deeply, somewhat poisonous. *Stems* unarmed, *with woolly hair. Leaves entire,* cordate at the base, at the apex markedly acuminate, *alternate. Male flowers* placed *one at a time* along the axis of a *spike-like raceme* or in short few flowered lateral racemelets, *opening wide* in anthesis and *possessing a small disc. Fertile stamens 3,* on short filaments curved over the disc ; between them are linear staminodes. *Capsules shaped as in* the section *Macroura* and *seeds similar.*

C. — **OPSOPHYTON.** *Tubers annually renewed,* descending into the soil in some species deeply or in others not deeply and then nauseous or poisonous. Man by selection has created races of *D. bulbifera* which produce no tubers and instead bear numerous large bulbils. *Stems unarmed,* in almost all species glabrous. *Leaves entire,* cordate at the base and apiculate to acuminate at the apex. *Male flowers* sessile or pedicelled, in spikes or spike-like racemes or sometimes in panicles, usually the inflorescence face earthwards, in two interesting species they face upwards : the flowers may or may not open wide in anthesis ; there is no disc. *Fertile stamens 6. Capsules in length up to 2.5 cm.,* facing upwards whatever the direction of the axis which bears them : the *seeds*

produced near the distal end of the placenta and *winged towards the base of the capsule.*

D. — **LASIOPHYTON**. *Tubers annually renewed,* descending into the soil in some species deeply, and in others not and then nauseous to poisonous and sometimes very poisonous. *Stems armed or unarmed,* pubescent in varying degree; in several of the African species the hairs consist of a basal globose cell and a flagellum-like apical cell with spiral thickening in the walls. *Leaves digitately compound,* usually with 3 or 5 leaflets, but sometimes with more : the remotest leaves may at times be simple ; the apex is small and much less glandular than in the other sections and *reached only by the midrib. Male flowers pedicelled or sessile,* if pedicelled in spike-like racemes and the bract carried on the pedicel, if sessile the flowers crowded together to the complete obscuring of the axis, opening little or very little. *Fertile stamens 6, or 3* with three staminodes, the staminodes clavate and serving the function of making it difficult for insects to reach honey without rubbing against the anthers. *Capsules shaped as in Opsophyton* and seeds produced similarly near the distal end of the placenta and *winged towards the base of the capsule.*

II. — **Stems twining to the right, and capsules broader than long.**

A. — **ASTEROTRICHA**. *Tubers annually renewed,* 1 to several in number, descending into the soil deeply and apparently not heavily loaded with nauseous or poisonous substances. *Stems,* etc., covered *with characteristic stellate* or dendriform *hairs. Leaves entire,* cordate at the base, apiculate at the apex (the degree of development of glandular tissue in it at present unknown). *Male flowers* in spikes or spike-like racemes or sometimes paniculate by the production of a second flower on the pedicel of another, opening in anthesis in various degrees, sometimes somewhat fleshy but not producing a disc. *Fertile stamens 3,* with three staminodes between them, or sometimes 6, in these male flowers the gynoecium may be peculiarly developed and have as its function the directing of insect-visitors to the stamens. *Capsules reflexed* and dehiscing upwards, with *seeds* produced about the middle of the placenta and *winged all round.*

B. — **ENANTIOPHYLLUM.** *Tubers annually renewed*, 1 of 2 or few in number, descending into the soil under a more or less developed woody knot of stem which in some species gives rise to specialized roots whose lateral rootlets indurate into fierce thorns : when this protective device is present the tubers are little length so that they lie under the thorns; but when the device is not present the tubers are deeply buried so as to get the alternative protection of the overlying soil. *Stems in all African species,* save for mucilaginous hairs on embryonic tissue, *glabrous. Leaves simple,* cordate at the base, with a well developed glandular acumen, alternate or opposite. *Male flowers sessile along the axes of spikes,* more or less fleshy, *scarcely opening* in anthesis, with no disc. *Stamens* 6 in all the African species. *Capsules* facing forwards and on dehiscing allowing the seeds to glide out; these *seeds* developed near the middle of the placenta and *winged all round.*

The section **MACROURA** (one species only in the Belgian Congo).

1. **D. sansibarensis** *Pax* in *Engl.,* Bot. Jahrb., XV, p. 146 (1893).

Syn. : *D. macabiha* Jumelle et Perrier de la Bâthie; *D. macroura* Harms; *D. sansibarica* Engl.; *D. toxicaria* Bojer; *D. Welwitschii* Rendle; *D. zanzibarensis* Dammer.

The szech botanist, Wenzel Bojer, was the first to make *D. sansibarensis* known. This was a century ago. He found it in cultivation in two gardens in the island of Mauritius and was informed that it had come from Mombasa. He learned also that various people had tried eating the abundant bulbils which it produces and had been very ill in consequence : so he gave to the plant the name *Dioscorea toxicaria,* and he had a drawing made showing its leaves and violet coloured bulbils. He printed a note on it in his « Hortus Mauritianus » (1837), but did not describe it. It was collected in the next instance by Welwitsch in Angola in 1855, then by Kirk on the Zambesi in 1859, by Hildebrandt on the mainland south of Zanzibar in 1881, by the missionary W. E. Taylor in the hills behind Mombasa in 1886, by Demeuse at an unrecorded place in the Belgian Congo in 1888, by Baron in Madagascar in 1889 and by Stuhlmann in the interior of Tanganyika Territory in 1892. These specimens were available when Pax in 1893 gave the name,

which it is incumbent on us to use, to Hildebrandt's specimen. In 1896 Descamps connected the east and west records together by obtaining it at Pweto in lat. 10° S. on the Congo-Tanganyika boundary: but botanists with specimens from the western side of Africa to determine failed to seek for a name for it among the known plants of the eastern side with the result that *D. macroura* and *D. Welwitschii* appeared. It is time to thrust them out of sight and to recognize that *D. sansibarensis* has a wide distribution in Africa. Data exist which show it to be present in the forests north and east of the Bights of Benin and Biafra and thence eastwards through the equatorial forests of the Congo to the very heart of Africa and in the eastern side of the Continent to be present on mountain outliers and elevations, etc. where rain is abundantly caught, here and there, from the Rabai Hills behind Mombasa to the hills behind Beira: and again it is in northern and central Madagascar. The records suggest that it is local in the Belgian Congo. Though it has not as yet been collected in the Province of Coquilhatville, it is surely there; for Dr. A. Chevalier collected it at Bangui, just outside, and Tessmann collected it at Mbuka, somewhat further to the west. It has been collected in the Province of Léopoldville at Yumbi (*Laurent*), near Lake Léopold-II (*Body*) and at Kitobola in Bas-Congo (*Flamigni*). It has not been collected in the Provinces of Lusambo and Stanleyville nor from the western parts of the Provinces of Costermansville and Élisabethville. But it is known to occur in the eastern parts of these, e. g. from Lokundu and Bobangi in Costermansville (*Ghesquière*) and Pweto in Élisabethville (*Descamps*).

No variations have been seen such as suggest varieties and the synonyms given above are to be sunk completely.

It is a handsome and striking plant, fully worthy of the place which it has obtained in various Botanic Gardens in different parts of the world and worthy of the attention of biologists on account of the glands of its large leaf-tip. This structure was described by Gentner in 1904 (Ber. Deutsch. Bot. Gesellsch., XXII, p. 144) and again in 1905 (Flora, XCV, p. 329) who demonstrated that the cavities produced in the leaf-tip are full of a pectose gum. This gum becomes the breeding ground for a bacterium which is « always present in great numbers, even in the living leaf » (Orr in Notes Roy. Bot. Gard. Edinb., LXVIII, p. 57, 1923). Orr proved that

the bacterium fixes nitrogen and that there is every reason to think that the fixed nitrogen is passed to the leaf.

I have described the early growth of the tuber (Blumea, I, suppl., p. 232, 1937). At it increases in size beyond the stage to which I could observe it, lobes appear. The ultimate appearance of the tuber of an old plant ought to be described and figured. Apparently the upper surface remains flush with the ground defying destruction by wild pigs and the lobes are thrust out laterally underground. It is possible that they may form in time new plants. Perrier de la Bathie (Mém. Soc. Linn. Normandie, Nouv. Sér., sect. Bot., 1, fasc. 2, p. 14, 1928) says they reach a weight of 30 kilos. They are gorged with starch and there is much food in them if it be separated from the associated poison. Wherever wild yams are used as food, the users know more or less imperfectly how to do this. They kill the tissues as by boiling; then by peeling, slicing and pounding enable water to reach the dead cells which can no longer resist its penetration; soaking in water for a sufficient time must follow; if the water be running water so much the shorter the time required; and if the water be salt so much the quicker the withdrawal of the soluble poison. Sea-water is therefore good; and it is an advantage to expose the pounded tubers to water moved by the tide. But inland, a famine striken man, resorting to such a root as this, must use what he can. He gets in the end a crude starchy meal.

Bourquelot and Bridel (in Journ. Pharm. Chim., XXVIII, p. 494, 1908) claim to have examined the tuber of this plant and to have found neither alkaloids nor glucosides. A new examination is required.

It is on record that the negroes in Africa sometimes cultivate this species. It is impossible that they should cultivate it for food: but they grow it as a weapon. Dr. A. Chevalier states that in Dahomey it is planted round the stores of grain of Sorghum to prevent goats from approaching. He states also that the Bondjos living just north of the Belgian Congo attribute magic properties to it as well as making an arrow-poison from its bulbils. It would appear likely that the planting round the grain stores is but an invocation of reputed magic properties. Gillet and Pâque (Ann. Mus. Congo, Bot., sér. 5, 1, p. 93, 1910) state that the tuber is pounded along with cassava to make a bait for the destruction of

wild pigs. They explain its vernacular name « sansala » as meaning the stupefier. The negro at Kisantu, whence they wrote, would cultivate the plant for the purpose.

Dr. A. Chevalier has recorded that Father Sacleux nearly killed himself by sampling the bulbils. As Bojer recorded, most violent vomiting follows the eating.

The section **MACROCARPAEA** (one species only in the Belgian Congo).

2. **D. Preussii** *Pax* in *Engl.*, Bot. Jahrb., XV, p. 147 (1893).

Syn.: *D. angondensis* Rendle; *D. Chevalieri* De Wild.; *D. hirtiflora* Pobeguin but not of Benth.; *D. longespicata* De Wild.; *D. Malchairii* De Wild.; *D. pterocaulon* De Wild.; *D. Thonneri* De Wild.

A naval surgeon, Edward George Irving, was the first to obtain this plant. In 1850, Captain Henry Foote, the commander of his ship, the « Styx », had been instructed to proceed from Lagos on the Nigerian coast in land to Abbeokuta, and Irving went with him. At Abbeokuta he obtained it. Five years later it was obtained by Welwitsch in Angola and soon afterwards by Joachim John Monteiro. Irving's locality is in low coastal country: Monteiro's localities are inland from Ambriz at a considerable distance and among mountains; and Welwitsch's inland from Loanda likewise among mountains remote from the coast. The fourth to collect it was Preuss who obtained it in the Cameroons. It was on his male specimens that Pax founded the species. Baker in 1898 (in Thiselton-Dyer, Fl. Trop. Afr., VII, p. 417) recognized that Irving's plant is conspecific with that obtained by Preuss; but did not realize that the others are also. He attributed consequently a very restricted distribution to this species.

In 1896 the first collections of it were made in the Belgian Congo: they were Dewevre's at Lukolela and Thonner's at Upoto. Two synonyms appeared shortly, for Rendle made one on Welwitsch's gatherings and De Wildeman one on Thonner's: but the specimens have not even one character which can be regarded as making them varietally distinct.

In 1899 Schlechter journeyed up the river Sanga, a tributary of the river Congo from the west, and collected this species, and in

so doing made a contribution towards showing that Baker's Nigeria-Cameroons area is continuous with the Congo-Angola area. His gathering is correctly placed by Dr. R. Knuth under *D. Preussii* in Engler's Pflanzenreich (IV-43, p. 223, 1924) but the geography is wrong in regard to it and in regard to several other species collected in the same part of Africa.

More new names soon appeared backed by little more than a new locality, — an extension of range — to render them plausible. Thus *D. Malchairii* was founded in 1912 on a specimen from Likimi, which town is 100 kilometres further north than the furthest in that direction at which *D. Preussii* had at the time been detected and in 1920 *D. longespicata* was founded on a specimen from a part of the Belgian Congo near the coast whence *D. Preussii* had not been brought earlier. It may be stated at once that I do not detect any characters in these for founding varieties.

When Pobeguin came face to face with *D. Preussii* in French Guinea, he mistook it for *D. hirtiflora*.

Relatively rich material of the species under consideration now exists in Herbaria, and it is demonstrated that it is distributed from the Futa-Jalon massif and adjoining Sierra Leone to Angola, and eastwards to Uganda and the Great Lakes. Here its eastward extension stops; and on the hill exposures of East Africa *D. hylophila* takes its place. This is interesting when we consider that *D. sansibarensis* does not show a like segregation of eastern and western forms. The difference between *D. Preussii* and *D. hylophila* is in the arrangement of the male flowers which in the one are produced singly along the axis of the inflorescence and in the other are produced on short lateral branches of the axis, as is satisfactorily figured in Engler's Pflanzenwelt Afrikas (II, p. 363, 1908). Elsewhere in the genus Dioscorea these contrasted characters characterize whole sections in which flowers are invariably placed singly, or invariably grouped. There is then a different value to be set on the character in different parts of the genus which, of course, is a phenomenon by no means unexpected; and with this remark the reader may be reminded that among oriental species, *D. esculenta* very occasionally, *D. flabellifolia* sometimes, and *D. spicata* exceedingly rarely, produce a second or even a third flower on the pedicel of the first in contradiction to what is the rule in their respective sections (see Prain and Burkill in Ann. Bot. Gard. Calcutta, XIV, pp. 84, 95 and 239, 1936).

As far as we know at present the areas of distribution of *D. Preussii* and *D. hylophila* are not quite in contact.

In the Belgian Congo the abundance of *D. Preussii* is greatest where the forests are most prevalent. Every collector who has sent plants from the Province of Coquilhatville has obtained it, and the specimens are too numerous for individual mention. To the north of this Province, i. e. in French Equatorial Africa, Dr. A. Chevalier obtained it as far towards the Sahara as lat. 10° N. Westwards its distribution is continuous through the Cameroons to the massif of Futa-Jalon and Sierra Leone. In the Province of Léopoldville it is possibly not less abundant than in the Province of Coquilhatville and is found down Belgian Congo almost if not quite to the coast. Fewer specimens have been brought from the eastern parts of the Belgian Congo; but it is certainly abundant in the western part of the Province of Stanleyville (e. g. Mobwaza, Dundusana, *Reygaert;* Bambili, *Seret;* Bambesa, *Pittery;* Doruma, *De Graer*; Yangambi, *Louis*). As yet there are no known specimens from the subprovince of Kibali-Ituri, but Mildbraed obtained it at Fort Beni under Ruwenzori in the subprovince of Kivu of the Province of Costermansville. It has been obtained quite recently in the Anglo-Egyptian Sudan (*Myers*).

In the southern part of the Belgian Congo and in the adjoining parts of Angola it becomes local. Its occurrence may be examined conveniently from west to east. Firstly in the west it cannot be rare in the subprovince of Bas-Congo nor in the northern part of Angola. The southernmost locality known for it is in the mountains of Golungo Alto and Pange Ndongo, say in 10° S. lat. It has been collected in the subprovinces of Kwango and Kasai, along the big rivers (Ipamu, *Vanderyst;* Pangu, *Vanderyst;* Luana, *Lescrauwaet;* Kakenge, *Gillardin*). The only specimen seen from the Province of Lusambo, subprovince of Sankuru, is Claessens' n° 927 from Katako-Kombe; and the only specimen from the subprovince of Lualaba is Overlaet's n° 1177 from Kapanga; and the only specimen from the subprovince of Haut-Katanga is Lynes's n° 470 from Kasenga.

As no specimens have as yet been brought from Northern Rhodesia it is quite evident that *D. Preussii* is at one of its limits in the southern part of the Belgian Congo.

Among the many specimens which I have examined I find a few to differ from the type without coming in any way within the

definition of the species I have reduced, except of course in so far as they are *D. Preussii*. These are characterized by relative glabrousness and I am calling them var. *glabra*. One of the specimens was obtained by Dacremont (his n° 429) in ravines running through savannah land in the neighbourhood of the Pic Cambier over the station of Matadi near the estuary of the river Congo. It is matched by a two specimens from Angola, namely Gossweiler's n° 8637 from Cango Yala and Dawe's n° 39 which is unlocalized. Further material is desirable.

There is great need of a full enquiry into the nature and uses of the tubers. Apparently they go down into the soil rather deeply and so escape destruction by wild pigs, etc. They escape being killed when the land is burned over for cultivation, or at any rate deeper parts escape. During the years when the land is cropped the plants persist under partial suppression, and when the cultivators abandons his parcel of land the plants come by their own with the returning forest. Even if it has been impossible for them to flower and seed, propagation may have been successfully carried on as they produce bulbils.

At times the negroes encourage it or even cultivate it. Laurent said so in 1905 but did not give a reason for their care of it. He made the note at Eala. In 1913 De Georgi recorded cultivation at Kutu and gave a reason stating that it was grown on the guard rails (tuteurs) in front of the houses of fetishes, i. e. it was grown as a plant of magic. Obviously here an appeal is made to a power in it to hurt for it is a guardian of the house. Another appeal to such a power to hurt is a custom recorded by Reygaert at Dundusana where the tip of its leaf, pulverised, is applied as a fetish to the tip of an arrow.

It is certain that the tuber is sometimes eaten. Pobeguin records that it is eaten in French Guinea. Goossens states that it is eaten about Lake Tumba in the south-west of the Province of Coquilhatville, and Nannan that it is eaten about Eala, a little further north. Mortehan says it is eaten at Dundusana and Claessens at Katako Kombe, which is in the Province of Lusambo. Nannan, in making his record, states that it is highly appreciated, and Goossens that it is regularly eaten. Staner, too, examining the plant at Eala, says the tuber is edible. None of these three state under what conditions it is eaten, nor how it is prepared for food. On the other hand Couteaux, also meeting with the plant of Eala, says

that the tuber is poisonous. Pobeguin states that to make it edible it undergoes a preparation extending over fifteen days. Pobeguin, it may be remarked, learned this in French Guinea, i. e. in a part of Africa so far from the Belgian Congo that we must not forget the possibility of the tuber differing. But Gossweiler, working in northern Angola and at no great distance from the Belgian Congo, stated that the tuber is inedible and the bulbils poisonous. After a review of all these somewhat confusing bits of information, the conclusion is reached that when cultivated the plant is not grown for food, but that it may be necessary at times to use the wild plant to satisfy the appetite. A writer in the Bull. Agric. Congo Belge (XIV, p. 669, 1923) states that men out hunting resort to it; and as the negro often stays in the forest for a considerable period when hunting, it may well be that he has leisure to prepare meal from the tubers. Moreover, as Pobeguin has not told us what the long process is, which is considered to require fifteen days, the possibility that with more effective methods shorter time suffices is not ruled out.

Bonnivair has recorded that wild pigs eat the tubers — a statement suggesting that they are not as poisonous as those of *D. sansibarensis*.

One further question has to be raised. The name « liteku » is recorded as belonging to this species, and « liteku » is said by Tharin (Bull. Agric. Congo Belge, VI, p. 171, 1921, and VII, p. 193, 1922) to have bulbils which become edible at maturity and to be grown for them in the neighbourhood of Barumbu in the western part of the Province of Stanleyville. It is possible that *D. bulbifera* is the cultivated plant indicated, but not proved. But whether it is *D. bulbifera* or *D. Preussii* to which Tharin referred. his remark that the harvest is reaped at eighteen months requires explanation since Dioscoreas are so intensely plants which go through their vegetative cycle once in twelve months.

The section **OPSOPHYTON** (with three species in the Belgian Congo).

## Key to the species.

Male flowers pedicelled, the pedicels standing horizontally and carrying the flowers at a right angle to the axis; perianth recurved ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. asteriscus.*

Male flowers sessile : perianth not recurved :

Leaves herbaceous; flowering spikes long; male perianth about 2 mm. long, rarely shorter, linear-lanceolate ... *D. bulbifera.*

Leaves coriaceous; male flowering spikes rather short; perianth only about 1 mm. long... ... ... ... ... ... ... ... ... ... *D. paleata.*

3. **Dioscorea asteriscus** *Burkill* sp. nov. *Tuber* subglobosum, crusta nigra. *Caulis* glaber, sinistrorsum volubilis, bulbillifer. *Folia* glaberrima, tenuissima, cordata, acuminata, ad 14 cm. longa, ad 16 cm. lata. *Flores maris* lutei, in racemis spiciformibus elongatis horizontaliter dispositi ; axis ad 10 cm. longus vel longior ; pedicelli 1-1.5 mm. longi ; bracteae anguste lanceolatae, *pedicello aequilonges;* bracteolae similes, minores. *Sepala et petala* in anthesin recurvata, late lanceolata, 1 mm. longa. *Stamina* sex, exposita. *Capsulae* iis *D. bulbiferae* haud facile distinguendae nisi maturae apice obtusiores.

Syn. : *D. sativa* Rendle in Journ. Linn. Soc. London, Bot., XL, p. 212 (1911) but of no other author.

Congo Belgica : Élisabethville, Route de l'Étoile, *Robyns* 1614.

Colonia Kenya : Mida, *Graham* 1909.

Regio Tanganyika : Makuyuni, *Koritschoner* 841; Duga, *C. Holst;* Shinyanga, *Romola D. Bax* 402; Morogoro, *E. M. Bruce* 1083; *Schlieben* 3682, 3775; Mpwapwa, *Hornby* 503; Tandaguri Hill, *Schlieben* 6044; Lutamba Lake, *Schlieben* 6088.

Insulae Zanzibaricae : Pemba, *Vaughan* 434.

Nyassaland : Sine loco, *Buchanan* (typus).

Rhodesia Australis : Chirinda, *Swynnerton* 531.

This is a species of East Africa which extends inland apparently as far as the extreme south-eastern corner of the Belgian Congo.

It was collected first by the horticulturist C. Holst in the north-eastern part of Tanganyika Territory and distributed from Berlin as *D. bulbifera* with « determinavit Engler » appended. It was collected in the second instance by Swynnerton in Southern Rhodesia; and Swynnerton's specimens were determined by Rendle as *D. bulbifera,* though the name *D. sativa* was used by him.

*D. asteriscus* is very clearly differentiated from *D. bulbifera* by its little star-like male flowers which are pedicellate and stand out from the axis of the raceme which bears them. The leaves are such as anyone might mistake for *D. bulbifera*. The capsules are slightly more triangularly obtuse at the apex than those of *D. bulbifera*; but to confuse them is pardonable. It requires experience to diagnose the plant by its foliage: and unfortunately the only specimen as yet brought from the Belgian Congo lacks the marks which make its determination perfectly certain. It should be sought again. This single specimen was obtained on an ant-hill in the Arboretum of the Comité Spécial du Katanga, on the Route de l'Étoile, Élisabethville station, by Professor Robyns.

Collectors of the plant describe the flowers as yellowish or pale yellow or clear yellow; so that they must be rather more conspicuous than the flowers of most species of Dioscorea.

In Kenya the tuber is used medicinally and called in Swahili « mtambu mwitu ». It is probable that its qualities lie in the presence of a saponin.

4. **D. bulbifera** *L.*, Sp. Plant. p. 1033 (1753).

Syn. : *D. anthropophagorum* A. Chev.: *D. Hoffa* Cordemoy; *D. Hofika* Jumelle & Perrier de la Bâthie; *D. latifolia* Benth.; *D. longepetiolata* Baudon; *D. Perrieri* R. Knuth; *D. sativa* Thunb., though usually mis-ascribed to Linnaeus; *D. sylvestris* De Wild. presumably; *D. violacea* Baudon; *Helmia bulbifera* Knuth.

*D. bulbifera* is the most wide-spread species of its genus in the world: it extends through tropical Africa and tropical Asia and eastward to the remotest islands of the Pacific. Man in the course of the Slave-trade introduced it into the Americas from Africa. Dr. A. Chevalier has put forward a view to which I cannot subscribe, namely that the plant in Africa should be recognized under the name *D. latifolia* as a species apart from the Asiatic *D. bulbifera;* but he has this in support of his thesis that the African

plants seem to be varietally distinct from the Asiatic. The Asiatic varieties have been enumerated by Sir David Prain and me in the Annals of the Royal Botanic Garden, Calcutta (XIV, p. 117, 1936) after a long study in life. Study of the varieties of Africa has so far been superficial : they must be grown together for the purpose.

Man in Africa, as in Asia, at an unknown and probably very remote period, took *D. bulbifera* into cultivation and ennobled it : but the negro as a persistent cultivator has fallen enormous distances behind the Asiatic, with the result that he has done far less good in the world and given less to humanity at large. In the ennoblement of *D. bulbifera* the Asiatic seems at a distant time to have learned he had got as far in the ennobling of *D. bulbifera* as his methods permitted and then to have turned to other yams which he found to be more promising : but the African has not got as far as the abandonment of the ennobling of this species. The courses have been parallel, the results a little divergent. Primitive man in both Continents discovered that the production of bulbils could be increased, and the bulbils induced to larger growth. He did not in this cause the plant to have greater vigour, but to store its food for the next season in little aërial packets instead of a larger terrestrial packet ; and it gratified him that the little aërial packets were more easily harvested. The Asiatic obtained by his efforts *D. bulbifera* var. *sativa* which has no terrestrial tuber ; he scattered it about the coasts he visited and left it, widely distributed but rare because other and better food-plants came into view. The African has obtained a plant equally without a terrestrial tuber but it differs strikingly from what the Asiatic obtained in bearing bulbils that are angular. For this plant Dr. A. Chevalier proposed the name « anthropophagorum ». Subsequently observing that an « anthropaphagorum » exists which is decidedly poisonous by the side of an « anthropophagorum » which is grown for food, he put forward the name « contralatrones » for the former, keeping the name var. *anthropophagorum* for the latter. The adoption of his two varieties is not at the moment one of practical application and I prefer to regard every plant with angular bulbils as *D. bulbifera* var. *anthropophagorum,* awaiting the time when study in cultivation has clarified the position.

Dr. A. Chevalier's *D. bulbifera* var. *contralatrones* is planted by cultivators on the outside of a yampatch in the hope that thieves who come in the dark, may take it only and be discouraged. The

name Dr. A. Chevalier chose is apt. Bye and bye it will be of utility. For the time being it is permissible to use the word race to indicate divisions of *D. bulbifera* var. *anthropophagorum* narrower than can be recognized in the Herbarium, and we can profitably turn now to review what I prefer to call the food-races of this variety.

These food-races are planted very widely through tropical Africa. They may persist for a time after cultivation, but it is probable that the persisting is short-lived and that they owe distribution and maintenance entirely to Man. They were taken to the New World during the course of the Slave-trade, and their names in the West Indies show that they travelled with Slaves from the Elmina Lagos coast. Probably only the most ennobled were taken, but a study of them has not been made yet. The names in Brazil differ. Nadeaud, a French Surgeon of Marine who resided for a time in Tahiti, stated that there is *D. bulbifera* in that island with angular bulbils. I have not seen it, but I keep in mind the possibility that the Spanish in South America who made an attempt to add Tahiti to the Spanish Crown in 1772, might have introduced it. There is preserved in the Herbarium of the Royal Botanic Garden, Peradeniya, Ceylon, a drawing of an angular bulbil; its source is unrecorded: perhaps it was a bulbil from a plant of African origin grown experimentally in the Botanic Garden.

It is evident from the last paragraph that the most ennobled race, or races, of *D. bulbifera* have been esteemed enough for carriage abroad; and it may be added, on the evidence of men of latin stock in America, that when properly prepared they can be good eating. Perhaps the best races are not as generous in yield as to hold more than a minor place in any rural economy.

It is apparent that all manner of stages between good and bad exist side by side in Africa. The cultivators know them by minute characters, eat what they can and eschew what they cannot. But now and then a mistake is made. One such which killed 32 soldiers in reported in full by De Wildeman in his « Dioscorées alimentaires et toxiques » (p. 105, 1938).

A series of bulbils drawn from different races should be analysed chemically to ascertain how far the poisoning is due to saponins and how far to alkaloids. Hooper (see Journ. As. Soc. Bengal, VII, p. 61, 1911) found some dioscorine in Asiatic *D. bulbifera*, but a saponin is the more abundant poison.

The distribution of *D. bulbifera* in Africa is almost universal between 10° N. and 10° S. lat. except where the Somaliland deserts extend into Kenya. To the north of 10° N. lat., it has been obtained on the Senegal coast, in the Futa-Jalon massif, on the upper Niger, in the Shari river basin on the south of Lake Chad, and in the Nile basin near the Abyssinian border. To the south of 10° S. lat. it is known to be present in Northern Rhodesia, Nyassaland and Southern Rhodesia. It is found everywhere in the Belgian Congo, so that every collector obtains it; but it would seem less prevalent in the Provinces of Lusambo and Élisabethville than in the others.

Dr. A. Chevalier has recorded that in the Gaboon toddy may be doctored by the use of this plant. Toddy is doctored by the use of other yams in India and elsewhere, the object being to induce irresponsible drinking.

De Giorgi says that one race is used at Kutu as a fish-poison. Laurent was told of a race with bulbils fatal to pigs which eat them. Reygaert, at Mobwaza, and Mortehan, at Dundu Sana, found the plant to be used in hunting; Reygaert does not say how, but Mortehan says as an amulet. Magic is therefore attributed to it.

5. **Dioscorea paleata** *Burkill* sp. nov. *Partes inferiores* ignotae. *Caulis* glaber, teres. *Folia* alterna, coriacea; petioli usque 4 cm. longi, basi latissime auriculati auriculis caulem amplectentibus; lamina longe-cordata, 5-7-nervis, ad 6 cm. longa, ad 5 cm. lata, vel forsan majora, polita, nervis conspicuis; nervi secundarii fere recti. *Spicae maris* 4-10 cm. longae, fasciculatae in axillis foliorum et bractearum remotiorum, basi ramiferae. *Flores maris* singillatim in axe anguste alato dispositi, ad anthesin aliquo modo cupulati. *Bracteae* ovato-acuminatae, incurvatae; bracteolae subtriangulares, dimidio minores. *Sepala* anguste ovata, 1 mm. longa, obtusa. *Petala similia,* aliquo modo obtusiora. *Stamina* sex, sepalis fere aequilonga, filamentis admodum tenuibus.

Congo Belgica : Inter Shangugu, territorii Ruanda et Usumbura, territorii Urundi, anno 1929, *Claessens.*

This species, which has been described above for the first time, requires no further remarks. Any economic properties it has are unrecorded.

The section **LASIOPHYTON** (species in the Belgian Congo 4, and a fifth, *D. Gossweileri* R. Knuth, just beyond the borders in Angola).

## Key to the species.

Fertile stamens 3, associated with 3 staminodes :
Bracteoles on the pedicels of the horizontally standing male flowers ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. Knuthiana.*

Bracteoles absent; a bract embracing the male flower which is placed at an angle to its pedicel ... ... ... ... ... *D. Quartiniana.*

Fertile stamens 6; male flowers packed close together :
Male flowers small, nestling among pubescent bracts; perianth glabrous; spike sessile ... ... ... ... ... ... ... ... ... *D. dumetorum.*

Male flowers larger, with pubescent sepals and small bracts; spike stalked ... ... ... ... ... ... ... ... ... *D. cochleari-apiculata.*

This section has almost the same distribution in the world as the section *Opsophyton;* it is found throughout tropical Africa, tropical Asia and the Pacific. Like *Opsophyton* it has developed a few species in South Africa, and these, compared with the tropical species, have narrower distributions. Whereas *Opsophyton* has one species, *D. bulbifera,* common to Africa and Asia, *Lasiophyton* has none, but the difference between the African *D. dumetorum* and the Asiatic *D. hispida* is not great; in fact Dr. R. Knuth has actually suggested the reduction of *D. dumetorum* to *D. hispida* (using for it the untenable name *D. triphylla*) and the earlier botanists mistook *D. dumetorum* for *D. hispida.* It is interesting that the climatic requirements of these two otherwise very distinct sections should be almost identical.

6. **D. Knuthiana** *De Wild.* in Bull. Jard. Bot. de l'État, Bruxelles, IV, p. 46 (1914).

This species is remarkably distinct. It is confined to the Belgian Congo, but may be expected to cross the borders somewhat, for it is widely found within. This is where it has been obtained : in the Province of Coquilhatville, subprovince of Ubangi-Congo, at Dundu Sana (*Mortehan*) ; in the Province of Léopoldville, subprovince of Bas-Congo, at Sanda (*Vandcryst*), Kisantu (*Gillet*), Sonzo (*Van-*

*deryst*) and Kimeyala (*Vanderyst*) ; and in the subprovince of Kwango, at Ipamu (*Vanderyst*) and Kikwit (*Vanderyst*) ; in the Province of Lusambo, subprovince of Kasai, on the Sankuru river (*Luja*) and at Lukombe (*Sapin*) ; in the Province of Costermansville, subprovince of Kivu, on Mount Mushumangabe (*Lebrun* and, independently, *Louis*) ; and in the Province of Stanleyville, subprovince of Uele, at Ango (*Bequaert*).

Nothing is recorded regarding its tubers ; but Gillet applies to it a vernacular name, « sansala », which it is suggested means intoxication and may mean that they are poisonous. The name is applied also to *D. sansibarensis* the tuber of which is exceedingly poisonous.

Gillet was the first to collect it. This was in the hills to the south of the river Congo where the river falls to its estuary. Next Luja found it : then Sapin in 1911, whose specimen was obtained in a manioc plantation. Mortehan obtained it in 1913. It was on this material, all of it male, that the species was founded. The capsules were not obtained until 1937 when Lebrun gathered them. It is to be stated that their cordate base is rather distinctive. But the most striking feature which the species has, lies in the attitude the male flowers take at right angles to the axis which bears them, and to the presence of a linear-subulate bracteole on the pedicel.

7. **D. Quartiniana** *A. Rich.*, Tent. Fl. Abyssin., II, p. 316 (1851).

Syn. : *D. Anchietae* Harms ; *D. apiculata* De Wild. ; *D. Beccariana* Martelli ; *D. cryptantha* Baker ; *D. Dinteri* Schinz ; *D. excisa* R. Knuth ; *D. Forbesii* Baker ; *D. Holstii* Harms ; *D. pentadactyla* Welw. ; *D. pentaphylla* A. Rich., not of L. ; *D. phascoloides* Pax ; *D. Schliebenii* R. Knuth ; *D. Schweinfurthiana* Pax ; *D. Stuhlmannii* Harms ; *D. Verdickii* De Wild. ; *Botryosicyos pentaphylla* Hochst.

*D. Quartiniana* is a species of considerable difficulty because its foliage varies much. The synonyms, above, were with one exception founded on vegetative characters and the gaps between them have been bridged by more extensive material than those who gave the names enjoyed. If the taxonomist's work is to be of utility to the physiologist and ecologist, it is necessary to reduce these names to varietal rank ; and so I propose to treat them.

*D. Quartiniana* is confined to tropical Africa. It is found along the southern limit of the Sahara from Senegal to Abyssinia and

southwards to a little beyond the Tropic of Capricorn, but as heavily forested country is unsuitable to it there are large lacunae over which it is absent. It reaches Delagoa Bay on the east side of Africa, and this is its southern outpost. It extends to the Comoro islands and Madagascar.

The first to collect it was John Forbes who visited its southern limit, Delagoa Bay, in 1823, collecting plants of horticultural value. The second to collect it was the surgeon Quartin-Dillon after whom it is named. He got it in Abyssinia in 1839 almost at its northern limit. W. P. Schimper gathered it in the same neighbourhood almost immediately afterwards. Hochstetter, acting as distributor of Schimper's plants, misplaced it in the Passifloraceae and having done that made a new genus for it.

In order to cut short the long story of the growth of knowledge of this plant and the extensions of known range which almost always led each time to the publication of a new name, I tabulate the pivotal specimens, giving the date and country of each important specimen, its collector and his number, and the name under wich it first went.

**Pivotal specimens for the nomenclature of the varieties.**

| Date & country | Collector & his number | Name given & date |
|---|---|---|
| Delagoa-Bay, 1823 ... ... | John Forbes. | *D. Forbesii*, in 1889. |
| N. Abyssinia, 1839... ... | Quartin-Dillon. | *D. Quartiniana*, in 1851. |
| do. ... ... ... ... ... ... ... | do. | *D. pentaphylla*, supposed to be of Linnaeus, 1851. |
| do., 1840 ... ... ... ... ... | W. P. Schimper. | *Botryosicyos pentaphyllus*, in 1844. |
| Angola, 1855 ... ... ... ... | Welwitsch. | *D. pentadactyla*, in MS. |
| Bahr-el-Ghazal, 1869 ... | Schweinfurth, 1879. | *D. Schweinfurthiana*, in 1893. |
| Niam-niamland, 1870 | do., 3928. | *D. phaseoloides*, in 1893. |
| Eritrea, 1870 ... ... ... ... | Beccari. | *D. Beccariana*, in 1886. |
| Angola, 1877 ... ... ... ... | Anchieta. | *D. Anchietae* nom. nud., in 1908, described in 1914. |
| Madagascar, before 1885 | Baron, 4658. | *D. cryptantha*, in 1887. |
| Tanganyika, Tanga ... | C. Holst, 527 b. | *D. Holstii*, in 1895. |
| Belgian Congo, Katanga, 1899 ... ... ... ... ... | Verdick, 269. | *D. apiculata*, in 1902. |
| S.-W. Africa, 1899 ... ... | Dinter, 705. | *D. Dinteri*, in 1900. |
| Belgian Congo, Katanga, 1900 ... ... ... ... ... | Verdick, 426. | *D. Verdickii*, in 1902. |
| Tanganyika, Eastern district, 1892 ... ... ... | Stuhlmann. | *D. Stuhlmannii*, in 1895. |
| Southern Rhodesia, 1902 | Eyles, 1141. | *D. excisa*, in 1924 |
| Tanganyika, Mahenge district, 1932 ... ... ... | Schlieben, 2247. | *D. Schliebenii*, in 1932. |

Some of the names above go under entirely, *D. Beccariana* for instance, which was given to a plant identical with the type. Others I find of use when employed varietally. Here is a key to the varieties which I have found it reasonable to separate, but it is tentative.

## Key to the varieties of *D. Quartiniana.*

Hair almost entirely absent from the lamina, but present on the petiole and petiolules :

Lamina so thin that the raphides stand out on the dried blade:

Tertiary nerves scarcely visible... ... ... ... v. *Schweinfurthiana.*

Tertiary nerves visible :

Bracts short and concave; spikes rather short... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... v. *Volkensii.*

Bracts and spikes larger ... ... ... ... ... ... ... ... ... v. *Holstii.*

Lamina thicker and the raphides difficult to detect :

Lamina narrowed gradually to both ends and the petiolules elongated ... ... ... ... ... ... ... ... ... ... ... ... ... v. *subpedata.*

Lamina oblanceolate ... ... ... ... ... ... ... ... ... ... v. *Stuhlmannii.*

Lamina linear-lanceolate (7 leaflets sometimes present the outermost pedately placed on the next petiolule)... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... v. *Schliebenii.*

Lamina if large spatulate with wavy margins ... ... ... v. *excisa.*

Hair present along the larger nerves, chiefly below :

Bracts (which are up to 6 mm. long, and concave) dark in colour ... ... ... ... ... ... ... ... ... ... ... ... ... ... v. *pentadactyla.*

Bracts similar, light-coloured ... ... ... ... ... ... ... ... ... v. *Lugardiae.*

Hair generally distributed on the leaves, densest below :

Lamina narrowed from mid-length to apex :

Leaflets among the inflorescences about 5 × 2.5 cm.:

Capsules 20-22 mm. long ... ... ... ... ... ... ... ... ... ... v. *vera.*

Capsules to 35 mm. long ... ... ... ... ... ... ... v. *Koritschoneri.*

Leaflets among the inflorescences conspicuously smaller, but there are large leaves below ... ... ... ... ... v. *Forbesii.*

Lamina rounded under the acumen :

Bracts short and markedly concave ... ... ... ... v. *phaseoloides.*

Bracts long and little concave... ... ... ... ... ... ... v. *apiculata.*

Hair generally distributed on the leaves, and forming a dense coat at the base of the bracts :

Leaves in shape and size as var. *vera* ... ... ... ... ... *v. cryptantha.*

Leaves small, usually up to 6 mm. long... ... ... ... ... ... v. *Dinteri.*

Names occurring in the above list pivotal specimens, which, in addition to *D. Beccariana,* become redundant are *D. Anchietae* and *D. Verdickii,* for the former is no more than var. *vera* and the latter is an unusual condition of *D. apiculata.* The reader may be referred to the Annals of the Royal Botanic Garden, Calcutta (XIV, pp. 143, 144, 147, 157, and 163, 1936) for illustrations of the way in which simple leaves such as *D. Verdickii* has, appear in the section *Lasiophyton* near the terminations of stems.

The key to the varieties contains additional names, e. g. var. *Volkensii* founded on Volkens' n° 2287 from Mount Kilimanjaro; var. *subpedata* which is a name suggested by Chiovenda (Ann. di Bot., IX, p. 142, 1911) for a condition he collected himself in Abyssinia; var. *Lugardiae,* founded on Mrs Cyril Lugard's n° 674 from Mount Elgon in Kenya; and var. *Koritschoneri* founded on Koritschoner's n° 915 from the Makuyuni district of the Tanga Province of Tanganyika Territory.

From the consideration of the variability of this widely dispersed species it is convenient to turn to the subject of the lacunae in its distribution, already mentioned, and in particular to its occurrence in the Belgian Congo. It has not been obtained by collectors as yet in the Province of Coquilhatville. If it occurs there, it must be local. This is borne out by the circumstance that it has not been obtained yet in the Province of Ubangi-Shari in French Equatorial Africa which lies to the north, nor in any of the political units lying to the west, Gaboon, Cameroons, Southern Nigeria, Dahomey, Gold Coast, Liberia and Sierra Leone which are well watered by rain from off the Atlantic. On the other hand it has been obtained in the Province of Chad which is further towards the Sahara than the Province of Ubangi-Shari, and in Northern Nigeria which does not get the rain the winds bring to Southern Nigeria.

It has not been obtained in the sub-province of Lac-Léopold-II; but in the subprovince of Bas-Congo it apparently occurs freely in the hills toward the Angola border and from these hills it extends southwards perhaps right through Angola, or if not right through, into a very large part.

There is one record only of its occurrence in the Province of Lusambo, namely on the river Lubafu (*Claessens*). But there are several records of its occurrence in the Province of Élisabethville; and from Élisabethville it extends northwards near the Great Rift

valley in the highlands of Kivu, Kibali-Ituri and Uele. There is an abundance of it in Uganda and over a large part of Kenya and in Tanganyika Territory. It is in the Anglo-Egyptian Sudan and its distribution thence reaches its extreme limits in Abyssinia and Erytrea.

The material which collectors have obtained in the Belgian Congo by no means conforms to one varietal type, but var. *vera* is the most general, and all the specimens from the subprovince of Bas-Congo except one, are it. Some of the specimens from the north-eastern parts of the Belgian Congo may be assigned to var. *subpedata;* and var. *apiculata* occurs in the south-east.

The tuber which is annually renewed, descends into the soil through about 20 cm. Being slender, the labour of digging it for food is but scantily rewarded and famine conditions are probably severe before any extensive use is made of it.

8. **D. dumetorum** *(Kunth) Pax* in *Engl.* & *Prantl,* Pflanzenfam., II-5, p. 134 (1888).

Syn.: *D. Buchholziana* Engl.; *D. daemona* Hook., Niger Fl., not of Roxburgh; *D. triphylla* Hochst., and also others, not of L.; *D. Vespertilio* A. Chev., not of Benth.; *Helmia dumetorum* Kunth.

The first European to collect this species was the Swedish surgeon Christen Smith who in 1816 accompanied Tuckey in his attempt to ascend the Congo river. The next was also a surgeon, namely Julius Vogel who collected it at Accra on the Gold Coast. The third was W. P. Schimper whose gatherings were made on the opposite side of Africa during his long sejourn in Abyssinia. Smith gathered no more than capsules and they remained undetermined. Both the other gatherings were thought to be the Asiatic *D. hispida,* until Kunth in 1850 gave the name *Helmia dumetorum* to Schimper's specimens. The close relationship between *D. hispida* and *D. dumetorum* is indisputable but they are quite distinct species. Surely they originated from a common ancestral stock which broke into two species when climates too dry for it cut the stock's area of distribution into two. At the present time 3600 kilometres separate the westernmost stations of *D. hispida* from the easternmost stations of *D. dumetorum,* embracing the deserts of Arabia, Persia, Beluchistan and Sind.

Together with a similar facies the two species possess a similar economic position, for they are alike the chief famine yam of either

Continent. This arises chiefly from the amount of easily obtained raw material that they afford. Their bulky tubers are produced so close below the surface of the soil that there is little digging to be done in getting them; they are apt to be abundant in localities where they grow, their intense poisonousness preserving them from destruction by wild pigs; the greater trouble begins when the process of preparing them follows the harvesting, — the process which has been outlined under *D. sansibarensis* above.

Much investigation of the tubers of *D. hispida* has been done. The poison is the alkaloid dioscorine; and this being soluble in water is removed by killing and exposing to water the cells which hold it. Boiling, peeling, slicing and pulping are successively employed, and the pounded mass is submerged in water, — moving water if possible, such as a running stream or a tideway, and salt water if available. It is recorded that these ways of making coarse starchy meal from *D. hispida* are used in Africa in getting a like product from *D. dumetorum*. As yet no exact comparison of the relative amounts of dioscorine in the tubers of the two species has been made, and in a general way it is as yet not more than an assumption that the poisonousness of *D. dumetorum* depends on dioscorine. However it would be wholly unexpected to find that this is not the case.

The African has slightly ennobled *D. dumetorum* so that there are races with less poison in them than others. These races he will grow for his own food, and also on the outside of his yam-patch in places exposed to theft, so that the thief may fill his hands with tubers of little worth. Such somewhat ennobled races as have come under my examination, had tubers little changed in shape; but Engler has published crude figures ascribed by him to this species (Pflanzenwelt Afrikas, II, p. 359, 1908), which Sadebeck (Kulturgewachse Deutsch. Kolonien, p. 71, 1899,) had assigned as probably *D. sativa,* presumably meaning *D. alata* and others have copied them, making out that there is considerable variation in the shape of the tubers. The position is altogether unsatisfactory. Figures which are trustworthy may be found in the Gardens' Bulletin, Straits Settlements II, opposite p. 92, 1918, and opposite p. 439 (1921).

The distribution of *D. dumetorum* in Africa is very similar to that of *D. bulbifera* in this continent; but the distribution of

*D. hispida* in Asia and the Pacific is narrower than the distribution of *D. bulbifera* in the same. But possibly *D. bulbifera* in Africa has a distribution a trifle narrower than that of *D. dumetorum*. More data are needed, however. The limit of *D. dumetorum* towards the Sahara is more or less in 10° N. lat., save at the west and east ends; at the west end is is found in Upper Senegal which lies to the northward of 10° N. lat., and where found in Abyssinia and Erytrea it is also to the northward of 10° N. lat.

Between 10° N. and 10° S. it is general except over the drier parts of Kenya and in the more or less arid north-western parts of Tanganyika Territoy. It is found in both Rhodesias and reaches the Transvaal.

In the Belgian Congo it seems to occur in every part of the Provinces of Coquilhatville and Léopoldville; and collectors have obtained it in most parts of the Province of Stanleyville. But collectors have not proved its presence in any general way in the other Provinces. It has been collected in three places in the centre of the subprovince of Sankuru and at one in each of the subprovinces of Kasai and Maniema. It has been collected in the Province of Élisabethville at Lukafu (*Verdick*), Élisabethville station (*Lynes*) and Kasenga (*Lynes*). In the subprovince of Kivu. Bequaert collected it at two places. Beyond the eastern boundaries of the Belgian Congo it has been collected in some abundance in Uganda, and this circumstance makes it probable that it is more abundant in the Congo provinces near the Rift Valley than the collections suggest.

Being in any case an inferior yam the abandonment of cultivation is apt to leave it behind to struggle with the vegetation which takes possession of the soil, so that cultivated races are added to that which is completely wild.

Cultivation of this species is recorded as common near Freetown in Sierra Leone (*Deighton*), on the Gold Coast where the edges of the yam-patch are planted with it (*A. S. Thomas*), in Dahomey (*A. Chevalier*), in the Cameroons (*Bates, Hédin*), in the Province of Chad among the Senas (*A. Chevalier*) and in the Province of Ubangi-Shari among the Bondjos (*A. Chevalier*); then in the Belgian Congo in the Province of Léopoldville, subprovince Bas-Congo (*J. de Briey*), in the Province of Costermansville at the foot of Ruwenzori (*Bequaert*), and in the Province of Stanleyville (*Rey-*

*gaert, Louis*) ; also to the south, in Angola among the Bakongo (*Dawe*). The reader will observe that all these records relate to west Africa.

Characters in the above-ground parts useful for recognizing cultivated races, have not been recorded. Bequaert's n° 4702 from Kituki at the foot of Ruwenzori, stated to be from a cultivated plant, has foliage with little tomentum and a tooth on the outer margin of each lateral leaflet. For convenience it may be given a name and var. *calva* is suggested. A closely similar leaf has been on a specimen from the island of S. Thome.

Dr. Knuth's var. *abyssinica* includes the type; and it awaits comparison with Dr. A. Chevalier's var. *glabrescens*.

Dr. A. Chevalier says (Bull. Mus. Paris, VIII, p. 530, 1936) of *D. dumetorum* cultivated in the Province of Ubangi-Shari : « Le tubercule coupé doit cuire pendant des heures avant de pouvoir être mangé. On le mange en tranches, mais on ne peut le réduire en farine. » He says it is very mucilaginous.

9. **D. cochleari-apiculata** *De Wild.* in Bull. Jard. Bot de l'État, Bruxelles, IV, p. 350 (1914).

Syn. : *D. Stolzii* R. Knuth ; *D. velutina* R. Knuth.

It may be accounted an interesting fact in African phytogeography that all the species of *Dioscorea* which spread through the whole of tropical Africa have close allies with more limited distribution to the south-east of them ; thus it is that *D. bulbifera* has several allies such as *D. asteriscus, D. Mundii* and *D. Burchellii* ; *D. Quartiniana* has *D. crinita* and *D. retusa;* and *D. dumetorum* has *D. cochlcari-opiculata* and *D. Dregeana;* but with the exception of *D. lanata* in Socotra, there has been no such development towards the north.

*D. cochlcari-apiculata* was first collected by Verdick in 1899, at Lukafu in the Province of Élisabethville. In 1902 A. Stolz, a resident in the hilly country immediately north of Lake Nyassa, also obtained it. Verdick's specimens were described in 1914 under the first name ; Stolz's in 1924 under the other names. It has been collected since it was first gathered, at two places in Northern Rhodesia : Mazabuka (*Martin*) and Namwala (*Gordon Read*) and in the Lindi province of Tanganyika Territory (*Schlieben*).

Gordon Read, in an informative note, says that the tubers which are called « mantembe » have four lobes, i. e. are like the tubers

of *D. Dregeana,* and that they are eaten in the form of meal after the poison they hold has been washed out. The stems he adds, attain a height of 4 metres and the leaves a diameter of 40 cm. It is probably a handsome plant. Of *D. Dregeana* there is a variety, — var. *Hutchinsonii* — characterized by the beautiful golden yellow pubescence of its young leaves, which is now in cultivation in gardens in South Africa as the « Rhodesian Velvet Creeper », and an attempt should be made to get *D. cochleari-apiculata* into cultivation alongside it.

The section **ASTEROTRICHA** (with 3 species in the Belgian Congo, if *D. fulvida* be reduced, as here, to *D. Schimperiana*).

## Key to the species.

Perianth of male 1.5-2 mm. long, its parts free; leaves here and there opposed :

Male flowers sessile, opening wide; all 6 stamens fertile (the broadly cordate leaves not seldom blackening in drying) ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. Schimperiana.*

Male flowers shortly pedicelled or scarcely pedicelled, opening to a bell; fertile stamens usually three, but the three staminodes vary so as to carry anthers ... ... ... ... *D. hirtiflora.*

Perianth 0.5 mm. long, the petals caught together at the tip so that the open flower has three slits wherein stand the three fertile stamens; leaves opposite and drying black... ... *D. semperflorens.*

10. **D. Schimperiana** *Hochst.* in sched. n° 1642 Plant. Schimp. Abyssin., sect. 3 and ex *Kunth,* Enum. Plant., V, p. 339 (1850).

Syn. : *D. Dawei* De Wild. ; *D. fulvida* Stapf ; *D. hirtiflora* Hutch. & Dalz. only as regards Dent Young's specimen, not of Benth. ; *D. Hockii* De Wild. ; *D. stellato-pilosa* De Wild., excluding var. *cordata.*

This species was collected first in 1839 or 1840 by Quartin-Dillon and collected again immediately afterwards by W. P. Schimper, both being at the same time in northern Abyssinia where they obtained it near its nosthernmost limit. In 1859 Sir John Kirk collected it almost at its southern limit. Quite naturally it happens that at their extremes collectors first meet with plants and when the first specimens come from very distant places only an excee-

dingly perspicaceous botanist avoids the error of making too many species. However Kirk's escaped being the foundation of a new name, because they were mislaid in a curious way (see Kew Bull., 1922, p. 59).

All the early specimens were from male plants. In 1861, Meller obtained female flowers in the south and, in 1863, Schimper obtained capsules in the north. In 1881, John Buchanan sent the plant to the Royal Botanic Garden, Edinburgh, from Nyassaland; and Daniel Oliver, whose botanical acumen was far above the average, recognized *D. Schimperiana* in these Nyassaland specimens despite the remoteness of Nyassaland from Abyssinia. But although the fact was published, it was overlooked by the Continental botanists, even by one so eminent as Engler.

The accumulation of data towards the knowledge of its complete distribution need not be set out here in further detail, but the results stated.

It is now known that *D. Schimperiana* is distributed in Africa more or less on the plan of the distribution of *D. Quartiniana*, though a little less widely. It occurs from Northern Nigeria to Abyssinia along the south of the Sahara, and from this line southwards, avoiding the equatorial forests of the Congo and the Cameroons. It does not reach Senegal, nor South-west Africa, nor the Comoro islands, nor Madagascar, as *D. Quartiniana* does. It is in parts of tropical Africa where savannah predominates that it grows.

In the Belgian Congo its area is restricted. It is unrecorded for the Province of Coquilhatville, and it seems to be very rare in the north and west of the Province of Léopoldville, for only one specimen has been seen, namely Bequaert's n° 7545 from the town of Léopoldville. In the subprovince of Kwango, Sapin obtained it at Kwilu. To the south of the Province of Léopoldville, i. e. in Angola, there would seem to be some abundance of it. Towards the east of the Belgian Congo its frequency increases and several collectors have obtained it in the Provinces of Lusambo and Élisabethville and it has been brought in some abundance from the bordering part of Northern Rhodesia. As to the Province of Stanleyville, it seems therein to be excluded from the afforested western parts, but present in the eastern parts towards Uganda. In Uganda it is common.

The specimens on which the names *D. Dawei* and *D. fulvida* were founded came from Uganda. They are Dawe's n° 754 (not 7054 as quoted when it was described) and his n° 908, from the forests of Unyoro. They differ from the type of *D. Schimperiana* in being suffused with purple-brown pigment, but are connected with it by a gradation of pigmentation in other specimens passing through the condition which Dr. Knuth has called var. *nigrescens,* because it blackens in drying. Besides Dawe's gathering, two others have been made of plants with the same pigmentation; they are Bequaert's n° 7545 from Léopoldville, which has been mentioned above, and a specimen collected by Trapnell at Ndola in Northern Rhodesia. If the reader will identify these localities on a map he will observe that each is some 2000 kilometres from the others, i. e. the pigmented condition we are discussing has appeared at remote spots within the area of the distribution of *D. Schimperiana.* Assuredly it is no more than an extreme condition of this species.

The variety *nigrescens* is more abundant in the southern part of the distribution-area of *D. Schimperiana* that elsewhere; and in fact no blackening has been observed in any of the more northern specimens. Besides giving the name var. *nigrescens,* Dr. Knuth has given an other varietal name, var. *vestita,* to indicate a condition more tomentose than Schimper's specimens; it does not blacken in drying.

He is in error in reducing *D. Schlechteri* to *D. Schimperiana.*

By way of summary it may be stated that *D. Schimperiana* is a species of country in tropical Africa where continuous forest cannot be developed, and in consequence of this its area of distribution enfolds the great Congo forests into which it cannot penetrate; and that it tends to be less tomentose at its north-eastern limit and to hold towards its southern limits a substance which causes the leaves to blacken in drying.

Information that the tubers are edible and used as food when famine drives the African to undertake the labour of digging them, comes largely from the south-eastern parts of the area it occupies. Kirk found them to be a famine food on the Shire river, Buchanan a famine food in Nyassaland, Swynnerton a famine food in Southern Rhodesia and Liebenburg a famine food in Tanganyika Territory. Blommaert has recorded that they are eaten in Katanga. Doubtless resort to them is as wide in distribution as the plant, if famine is

severe enough and the yam plentiful enough. The records will, therefore be extended.

*D. lanata* Balfour f. is an insular endemic, found in Socotra, with the stock of *D. Schimperiana* as its origin.

11. **D. hirtiflora** *Benth* in *Hook.*, Niger Fl., p. 537 (1849).

Syn. : *D. anthropophagorum* var. *sylvestris* A. Chev. ; *D. Dusenii* Uline ; *D. polyantha* Rendle ; *D. rubiginosa* Benth. ; *D. sativa* var. *sylvestris* A. Chev. in regard to his n° 18269 at least ; *D. Schimperiana* var. « *danda dian* » Pobeguin ; *D. stellato-pilosa* var. *cordata* De Wild.

*D. hirtiflora* is a difficult species on account of its variability within the flower where the degree of sterilization of the three staminodes does not always proceed to the extreme and where the styles in the male flower have a striking elongation not always the same. The flowers should be studied alive and the exact method of pollination made known, for the variability is connected with this.

It was collected in the first instance by Henry Smeathman, a « collector of objects of Natural History », sent in 1775 to Sierra Leone by the Duchess Margaret Cavendish Bentinck, wife of the second Duke of Portland. It was collected in the second instance by George Don who visited Sierra Leone in 1822, and in the third instance by the surgeon Vogel. With Don's and Vogel's material before him, Bentham in 1849 published the name *D. hirtiflora* for the male plant which had been collected by Vogel and the name *D. rubiginosa* for the female plant which was Don's. How Bentham, whose dislike of splitting species was intense, came to do this is difficult to explain ; but Bentham was not happy in his work on the Dioscoreas.

The next collector to obtain it was Welwitsch and this was in Angola, a considerable extension of range ; next Charles Barter obtained it in Nigeria. Baker (in Thiselton-Dyer, Fl. Trop. Afr., VII, p. 416, 1898) assigned Welwitsch's specimens to *D. hirtiflora*, but Rendle looking carefully into the structure of the male flower made a species, *D. polyantha*, on them, with some justification ; but I regard the differences he found as of varietal rank. Baker failed to recognize *D. rubiginosa*, because by some mischance the sheets at Kew had not been written up : but they exist and there is no doubt as to their identity.

The evidence now to hand regarding the distribution of this species suggests that it is not continuous, but broken into three areas: one embraces the Futa-Jalon massif and Sierra Leone; the second Southern Nigeria and the Cameroons; while the third and largest crosses Africa between lat. 5° and lat. 20° S. with an extension northwards into the Province of Stanleyville (*De Graer's* n° 667 from the Bwere river near Doruma) and another extension into Kenya (*Graham's* specimen from Arabuko). This large area includes the southern parts of the Belgian Congo, the northern parts of Angola, Northern Rhodesia and the southern half of Tanganyika Territory. There is evidence in the records of the months at which it flowers that the climatic regimes cause the west to differ from the east, as near the Atlantic flowering occurs in March and April, but in the Province of Élisabethville, in Rhodesia and in Tanganyika Territory, it occurs from October to January. It flowers in Sierra Leone and in Nigeria in October and November, i. e. at the end of the rains.

Here is a question which obtrudes itself — what is the effect on the success of this species of a climatic regime with two rainy periods in the year ? — does the interruption inhibit success ?

*D. hirtiflora* breaks up into varieties and those I recognize may be given in a key thus :

Stamens which stand before the petals with normally shaped anthers, perhaps sterile, overtopping the other invariably fertile stamens... ... ... ... ... ... ... ... ... ... ... ... v. *polyantha.*

Stamens which stand before the petals perhaps with indications of anthers, but such reduced to minute notches on a linear or filamentous body :

Staminodes as linear bodies, not much longer than the fertile stamens :

Flowers scantily pubescent ... ... ... ... ... ... ... ... v. *Grahami.*

Flowers abundantly pubescent :

Lower surface of the leaf with hair which makes a close felt... ... ... ... ... ... ... ... ... ... ... ... ... v. *nyassica.*

Lower surface of leaf with hairs which scarcely touch each other... ... ... ... ... ... ... ... ... ... ... v. *Trapnellii.*

Staminodes as filamentous bodies, much exceeding the fertile stamens, associated with filamentous styles constructing a kind of entanglement within the flower; the fertile stamens with a large hump on the back of the filament just below the anther... ... ... ... ... ... ... ... ... ... ... v. *originaria.*

The variety *polyantha* can be recognized among the specimens brought from the subprovince of Bas-Congo, and specimens from the south-eastern parts of the Belgian Congo can be assigned to the varieties *nyassica* and *Trapnellii*.

12. **D. semperflorens** *Uline* in *Engl. & Prantl,* Pflanzenfam. Nachtr. zu II, 5, p. 87 (1897).

Syn.: *D. hypotricha* Uline; *D. prachensilis* Baker as regards Hens n° 174 only, not of Benth.: *D. Schlechteri* Harms.

This striking species is confined to the well afforested parts of the Belgian Congo. It was collected in the first instance by the traveller Pogge in the year 1875 in what is now the subprovince of Kasai. The next to obtain it was Hens and this was in the Province of Coquilhatville. The third to collect it was Schlechter who found it at Stanley Pool in the Province of Léopoldville. Each specimen received a different name. Uline caught at a trivial difference in the leaf margin between Pogge's and Hens's specimens and called them respectively *D. semperflorens* and *D. hypotricha*, and later Harms published the name *D. Schlechteri* for Schlechter's, but did not describe it. Baker in 1898, overlooking Uline's names, assigned Hens's specimen in an inexplicable way to *D. prachensilis*. De Wildeman in 1914 correctly reduced *D. Schlechteri;* but this did not prevent Dr. Knuth from mis-assigning it in 1924 to *D. Schimperiana*.

Owing to the great interest of this Dioscorea as a species more intensely associated with forest that its allies, it is desirable to give its distribution in detail. It is as follows. In the Province of Coquilhatville, subprovince Ubangi-Congo, it is proved to occur at Musa (*De Giorgi*) , Dundu Sana (*Mortchan*), Kole Lomgombe (*Jespersen*) and Bangala (*Hens*) ; and in the subprovince of Tshuapa, about Eala (many collectors). In the Province of Léopoldville, subprovince of Bas-Congo, it has been proved to occur at Kisantu and villages among the neighbouring hills (*Gillet, Vanderyst*) and at Stanley Pool (*Schlechter*) ; and in the subprovince of Kwango, on the Kasai river (*Luja*) and at Ipamu and Pangu (*Vanderyst*). In the Province of Lusambo, subprovince Kasai, it has been proved to occur at Mukenge (*Pogge*), Luebo (*Achten*), between Lulue and Bena Makima (*Sapin*) and at Luluabourg (*Gillardin*). In the Province of Costermansville, subpro-

vince Maniema, it was collected between Albertville and Kabambare (*Luxen*), but as his specimen consists of capsules only, verification is desirable. In the Province of Stanleyville, subprovince Uele, it has been demonstrated to occur at Mobwaza (*Reygaert*) and at a number of places near Yangambi (*Louis*).

It is recorded as occurring in virgin forest, in secondary forest and on clearings. The records of its occurrence in virgin forest may be interpreted as in breaks in virgin forest where fallen trees or rivers or footpaths let light fall under the canopy. But as the records show, it needs for its growth the moisture which enables forests to thrive, and it seems commonest along the courses of the large rivers.

Uline, having given the name *D. semperflorens* because Hens had said it flowers all the year round, applied the name *D. hypotricha* to Hens's specimen, and *D. semperflorens* to Pogge's; but as the two specimens are one species, it does not matter. Hens had made his note at Bangala in the very centre of the distribution-area of the species, not meaning, surely, that the one individual plant flowers all the year round, but that it could be found in flower all the year round. The data of flowering have been examined, and they demonstrate that it has an extended flowering time. Taking the months of the year in order it flowers thus: — in January at Eala; in February at Eala and in the Bas-Congo; in March in the Bas-Congo; in April at Eala and in the Bas-Congo; in May in the Bas-Congo, near Coquilhatville and on the Kasai river; in September at Eala, Mobwaza and Yangambi; in October at Yangambi and in November at Mobwaza and at Yangambi. Flowering therefore is recorded as if it proceeds eastwards, but at Eala certainly occurs over several months. The seasonal behaviour of an individual plant ought to be recorded. May I suggest that this could be done from the Botanic Garden at Eala ?

The tubers have not been fully described, but Hens, who stated that the plant is cultivated, said that they attain several pounds in weight. Laurent, Sapin, Mortehan, De Giorgi and Nannan, each collecting it at a different place, have stated that the tuber is edible, and Laurent has stated that its colour is violet. On the other hand Corbisier-Baland has recorded that it is poisonous.

It is said that bulbils are produced, but I have not yet seen them.

The male flowers are very shortly stalked with a slight fleshiness in the pedicel. The broadly rounded sepals embrace the whole flo-

wer; the rather narrow petals appear to be caught together at their apices so that access to the interior of the flower is by three slits and in these slits in the male flower the fertile stamens stand. Insects seeking honey must pass over them. It is the case that in many Dioscoreas the staminodes which are of considerable size serve the function of compelling insects to pass over the fertile anthers on their way to get honey; here, in *D. semperflorens,* the petals direct them, and the unwanted staminodes are extremely minute.

A difference, not used by Uline, between Pogge's and Hens's specimens may be allowed varietal rank.

Sepals almost twice as wide as the petals... ... ... ... ... v. *vera.*
Sepals shorter and petals relatively broader ... ... ... v. *hypotricha.*

## The section **ENANTIOPHYLLUM.**

This section is the most difficult in the genus; it has numerous species distributed through the moister parts of tropical Africa and tropical Asia; and in Asia it extends well beyond the Tropics by reaching Japan; but it does not extend beyond the Tropics in Africa.

There are no species in it natural to both Africa and Asia; but the Asiatic *D. alata* is an introduced food-plant of Africa, having been brought to Madagascar and the Zanzibar coast by invading or colonizing Asiatics and to west Africa by the Portuguese who implanted it in a region where the Africans already made not a little use of the similar and indigenous *D. cayenensis.*

I believe that hybridization is extensive in the section and am not alone in this which is a view put forward by Dr. A Chevalier; and I see in *D. cayenensis* an imperfect cultigen, selected and somewhat ennobled by the natives of Africa from out of hybrid products provided by Nature in places where such species as *D. abyssinica* and *D. minutiflora* meet. I shall elaborate this view somewhat on a later page under the heading « D. cayenensis ».

Characters in no way connected with any selective activity on Man's part must be used for classification; and the most useful are to be found in the shape and arrangement of the male flowers. The following key is put forward as one on which work can be done; but no claim is made that it cannot be improved.

## Key to the species.

Perianth in all parts rather fleshy :

Stems quadrangular and 4-winged; male spikes in big leafless inflorescences... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. alata.*

Stems not winged and more or less without ridges; male spikes scarcely segregated from the foliage :

Leaves herbaceous in texture; plant not coarse :

Male flowers on slender axes and rather less than their own diameter apart; flowering proceeding up the spike :

Male flowers with a narrow base ... *D. Liebrechtsiana.*

Male flowers with a broad base... ... *D. odoratissima.*

Male flowers on stouter axes, for the most part their own diameter apart or still more spaced; flowering scarcely finished at the base of the spike when occurring at the apex :

Tubers going deep; stem without prickles ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. abyssinica.*

Tubers not going deep; stem armed chiefly at the base... ... ... ... ... ... ... ... ... ... ... ... *D. cayenensis.*

Leaves firm :

Plant not coarse; leaves more or less sagittate ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. Lecardii.*

Plant coarse; leaves cordate (in the surface soil a very woody piece of stem is formed and the tubers arise below it and as far as is known are protected by thorny roots):

Leaves very coriaceous... ... ... ... ... ... ... *D. Claessensii.*

Leaves firm to coriaceous, with acarodomatia :

Primary nerves 5-7, the first pair embracing a broadly lanceolate area :

Capsule with wings 3.5 × 2.5 mm. ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. Pynaertii.*

Capsule smaller ... ... ... ... ... ... *D. minutiflora.*

Primary nerves 3-5, usually 3, the first pair near the margin of the leaf *D. smilacifolia.*

Sepals scarious ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... *D. Baya.*

13. **D. alata** *L.*, Sp. plant., p. 1033 (1753).

Syn.: other names given to the species in Africa, *D. colocasiifolia* Pax in regard to the leaf, the rest of the description based on a scrap of *D. dumetorum; D. Sapini* De Wild.

Sir David Prain and I have dealt with the asiatic origin of this cultigen in the Annals of the Royal Botanic Garden Calcutta (XIV, p. 308, 1939). Its home was eastward of India and thence at an early date it was spread in Asia. In the course of time it became important to those who went to sea, as food on their voyages; but so long as these voyages, starting from the coasts of India, with yams in the ships provisions, ended at ports on the Red Sea and Persian Gulf it was altogether out of the question to establish *D. alata* from surplus tubers in new homes. But when Arab colonies in the 7th century grew up on the African coast to the south of the Equator and shipping from India began to cross the Indian Ocean to them, *D. alata* may well have obtained a footing. Whether it did or did not, it obtained a little later a footing in Madagascar by the settling of yam-eating Malays in that island; and as the Arabs of Zanquebar traded to Madagascar and had settlements there, the passing of *D. alata* backwards and forwards was sure. But on the African mainland to penetrate inland was impossible and did not occur. Conditions were altered when the Portuguese learned how to reach India via the Cape. They then took *D. alata* to their various settlements on both sides of the Atlantic. This in outline is what happened, and Dr. A. Chevalier's statement : « Les Noirs lors de leur migration vers le Continent Africain, apportaient avec eux sur la terre d'Afrique... les ignames de cette espèce » (Bull. Mus. Paris, sér. 2, VIII, p. 522, 1936) cannot be upheld.

From the Portuguese settlements of the Guinea and Gaboon coasts the Africans took the yam inland and now it is found widely from a line commencing in the west on the Gambia to the Victoria Nyanza, southwards to a line commencing in the west at Loanda in Angola and running to Lake Tanganyika. Statements which have been printed that it occurs in Abyssinia and the Anglo-Egyptian Sudan were founded on mistakes in identification.

The records of its dispersal in the Belgion Congo are given here, for those who can to supplement. In the Province of Léopoldville, subprovince of Bas-Congo, it is known to be grown in Mayombe

(*J. de Briey*), at Kitobola (*Pynaert*), and Kisantu (*Vanderyst*) ; in the province of Lusambo, subprovince of Kasai, at Luluabourg (*Descamps*), and in the subprovince of Sankuru at Katako Kombe (*Sparano*) ; in the Province of Élisabethville, subprovince of Lualaba, at Katola (*Sapin*) and subprovince of Tanganyika and Haut Katanga (teste *De Wildeman*). The Botanic Garden at Eala has imported many food races.

14. **D. Liebrechtsiana** *De Wild.* in *De Wild. & Th. Dur.*, Bull. Herb. Boiss., Série II, I, p. 53 (1900).

This species is to be found from Nigeria to Angola and from the Atlantic to Ruwenzori. It was collected first by Welwitsch in 1855 in Angola, but it was not described until Gillet had collected it in the Belgian Congo in the year 1901. Laurent collected it at Yumbi deeper in the dependency, in the year 1903. After this date it became confused with *D. cayenensis* in the following manner, which explains why Dr. A. Chevalier has recently reduced it to *D. cayenensis*. A tuber of the latter was sent to Brussels where it was grown but did not flower. It was determined as *D. Liebrechtsiana* and very good figures published, figures of course without flowers. These excellent figures have been, for most students of the genus, their guide to *D. Liebrechtsiana*. But now it must be understood that they do not represent it.

*D. Liebrechtsiana* is usually wild, but it seems cultivators are not averse to allowing it to occupy as a volunteer a place in their cultivation and may eat the tuber if they need it. As a vernacular name for it in the subprovince of Bas-Congo « bisadi » or « kisadi » is recorded and it is said that this word means stringy.

It has been collected in the Provinces of Coquilhatville and Léopoldville at several places ; in the Province of Lusambo at Kidongi (*Allard*) and Kakenfe (*Gillardin*) ; in the Province of Costermansville at Rutshuru (*Bequaert*) ; and in the Province of Stanleyville, subprovince of Uele, at Mobwaza (*Reygaert*). Its association is with forest.

15. **D. odoratissima** *Pax* in *Engl.*, Bot. Jahrb., XV, p. 146 (1893).

Syn. : *D. prachensilis* D. H. Scott in Ann. Bot., XI, p. 327 (1897) not of Benth. ; *D. Costermansiana* De Wild.

This species received its name from Pax in 1893 ; and Büttner's n° 104 from Togoland may be regarded as the type. But Pax cited

also Pogge's n° 1043 from Lunda in the Belgian Congo and Welwitsch n° 4035 from Angola. The last is *D. Liebrechtsiana*. What Pogge's plant is has not yet been ascertained.

In the year before Pax issued his description, Scott Elliot had sent to Kew living material of this species from Sierra Leone. It was grown for a time under the name *D. multiflora* but how it came by this name is not evident. In 1894 it flowered and was now determined as *D. praehensilis*. Two years later it was repotted and when turned out of the earth its fierce thorns were revealed. These were figured by Dr. Scott. His figure shows them displaced downwards round the tuber in consequence of the confinement of the plant-pot, but surely in Nature they spread. The plant remained in cultivation until 1920, flowering from time to time.

Such material as collectors have obtained in Africa shows that this species is distributed from Sierra Leone to Angola, but it has not been abundantly collected except in the hills of the Belgian Congo in the subprovince of Bas-Congo where Vermoesen, Gillet and Vanderyst have obtained it at five named localities. There is one locality for it in the Province of Élisabethville, namely Kasenge (*Robyns*).

Nothing is known of it economically.

16. **D. abyssinica** *Hochst.* in sched. 1720, *Schimper,* Plant. Abyssin., ser. 3 and ex *Kunth,* Enum. Plant., V, p. 387 (1850).

Syn.: *D. sagittifolia* Pax, perhaps, as will be explained under *D. Lecardii; D. togoensis* R. Knuth.

This species was collected in the first instance by Quartin-Dillon and almost immediately afterwards by W. P. Schimper. Hochstetter as distributor of Schimper's specimens put the name *D. abyssinica* on them.

Schimper failed to get capsules. Except for these and for the underground parts, Kunth gave a very full description in 1850, based on Schimper's material. Richard supplied a description of the capsules in 1851 from Quartin-Dillon's material. Schweinfurth in 1865 at Callabat, close to the western Abyssinian border, obtained male flowers and almost ripe capsules. These capsules are glaucous; and as far as evidence extends to have glaucous capsules is a character of this species. But specimens identical with true *D. abyssinica* in foliage and in characters visible in the male inflo-

rescences and in flowers have been obtained in the southern part of Tanganyika Territory, the capsules of which are polished brown and not glaucous. I am not yet prepared to give a name to these southern specimens, but must beg for more material. The true *D. abyssinica* is found from northern Dahomey to Abyssinia and southwards to the immediate neighbourhood of the northern borders of the Belgian Congo and assuredly it will be found at least in the remoter parts of the Province of Stanleyville.

17. **D. cayenensis** *Lam.*, Encycl. Meth., III, p. 233 (1789).

Syn. : *D. aculeata* Antommachi, and also Balbis ex Kunth; *D. angustiflora* Rendle; *D. Bertcroana* Kunth; *D. colocasiifolia* Dalziel, but not of Pax; *D. Demeusei* De Wild.; *D. Liebrechtsiana* De Wild. in part from 1905 forwards; *D. Moma* De Wild.; *D. occidentalis* R. Knuth; *D. prachensilis* Baker and several other authors in part, not of Benth.; *D. pruinosa* A. Chev.; *D. rotundata* Poir.; *D. sativa* Beatson presumedly, not of L.

To the African himself is entirely due the invention of *D. cayenensis* as a crop plant. Its cultivation was not taught to him from outside as was the cultivation of the chief starchy root-crop now in Africa. The Arabs taught him to grow *Colocasia*, the Portuguese to grow *Manihot* and *Ipomoea Batatas*. He discovered how to make use of *Dioscorea cayenensis*. But at what period it is not possible to say. As its cultivation is most intense in Guinea, the invention of its cultivation was probably in Guinea. I suggest that in the forests of this part of Africa the genus Dioscorea evolved the Dioscoreas with fierce thorny roots. The protection the thorns afforded enabled the tubers to be developed in the upper parts of the soil, close under their thorns and made it unnecessary for them to be loaded with poison, the wild pigs being unable to turn the defence when rooting. Outside the denser forests the genus evolved deep burying yams without thorns, tender and good to eat when got, but hard to get. Crossing where these two types met, afforded the material whence Man selected *D. cayenensis*. In selecting it his protective activity was added to the natural protection of the thorns and a less thorny condition sufficed. Moreover some of the delicacy of the deep-going tubers was transferred to the hybrid product.

The shifting agriculture of the African results in crop-plants being left behind to struggle with the returning vegetation after he has moved on ; he leaves *D. cayenensis* of course, and the forest holds it as long as it can survive. The less ennobled, the longer will it survive. Now and then he reclaims it, transplanting it to his yam-patch, a process to which Dr. A. Chevalier has given the name « protoagriculture ». His ability to ennoble is thus perpetually checked by loss of direction ; yet he has a very great idea at times of niceness in his yams. The excellent work done by Dr. Irvine and Dr. Dalziel in translating the fanciful names he applies to good races shows that at least in Guinea quality is greatly appreciated. Here I should like to insert a plea for the better collecting of vernacular names ; it is not enough to record them as heard, but what they mean to the user should be enquired and recorded too. I have made an index of the names, more than 6000, which have come my way, but until the names have some meaning, it is of little use.

The reader is perhaps aware that Nature has used the device of thorny roots in an Asiatic species, *D. esculenta,* and of course understands that it came in there in order that this plant, also, might protect its tubers against the depredations of wild pigs. Man in Asia took possession of the species for cultivation, for with his prehensile hand and the use of a stick it was simple for him to turn the defense. *D. esculenta* is perhaps an older crop-plant of Man than any other yam. Man, as his agriculture advanced, substituted more and more his own watchfulness for the defence of thorns with the result that the more highly ennobled races of *D. esculenta* are without thorny roots. It is clear that what the Asiatic has done for that species, the African has been doing for *D. cayenensis;* he tends to grow thornless races if he can be sure of the crop. Moreover the fiercest « chevaux de frise » met with in Dioscoreas is the result of several years accumulation of thorny roots, for these intensely hard thorns persist for a long time in the soil, and Man wanting an annual harvest if possible, does not permit the thorns to accumulate ; from which it follows that a cultivated plant is bound to be less protected that a wild plant, and the act of bringing it into a cropping system would drive Man to rely less on the thorns and more on his vigilance. *D. cayenensis* has thornless races, just as *D. esculenta* has.

When the Portuguese had settled themselves in Africa they took advantage of the established Slave-trade to trade in slaves them-

selves and with the aid of other nations to supply the plantations in America with forced labour. They took the food-plants of the wretches they enslaved to the New World and in this way four species of the genus Dioscorea were established in the Americas, one of them being *D. cayenensis*. It is very interesting that this yam in America is not possessed of thorny roots, for that fact shows it was only the most ennobled races that were taken. Creole names in use in the West Indies indicate that the yams were carried to them from the Elmina Lagos coast; and a careful study of the yams in life suggests what the coast liked at the time, about 1600 A. D., when a Dutch trader of Benin described in De Bry's « India Orientalis » as excellent those yams « upon which the settlers lived well ».

It was on a specimen from the Guiana's, brought to France, that Lamarck defined this species thinking it to be natural to America. In 1797 Riedlé, a horticulturist attached to Baudin's expedition to the West Indies, gathered in Porto Rico another specimen which Poiret, continuing Lamarck's « Encyclopaedia », described as *D. rotundata*. So completely had the transfer of this species across the Atlantic been obscured that he too thought it American.

In 1915 I received in Singapore a consignment of living tubers from West Africa and by cultivation I observed that I could classify what I had into two, — those whith white fleshed tubers and growth extending over upwards of ten months, and those with pale yellow fleshed tubers and growth extending over almost the whole of a year. The latter produced the tubers under a larger harder woody knot of tissue than the former (for figures see Gard. Bull. Straits Settlements, II, plates opposite, pp. 87 and 89, 1918). I regarded the yellow-tubered plants as *D. cayenensis* and the white-tubered plants as *D. rotundata;* but after endeavouring for twenty years to work on this view, I have been forced to abandon it and to believe there is no specific difference between the two. What there is, is a gradation, the white-tubered having more of the one parent and the yellow more of another of the parents of the cultigen. If the white part was not contributed by *D. abyssinica*, it was contributed by a species of the « abyssinica type », and if the yellow part was not contributed by *D. minutiflora* it was contributed by a species of the « minutiflora type ». However I believe that it is certain that *D. minutiflora* has contributed much to the make-up of *D. cayenensis* and that « cayenensis » with fierce root-

thorns is « cayenensis » nearest to *D. minutiflora.* I recommend attention to this by students of negro agriculture.

As the abundant synonymy above shows, other botanists have endeavoured to segregate species out of the *D. cayenensis* complex. But attempts divorced from cultivation merely encumber the literature. The study is one for the field.

The field botanist will perhaps decide that *D. cayenensis* is polyphyletic.

In the discussion of *D. Lecardii* it shall indicate why I think part of *D. sagittifolia* Pax, to be this species. In the discussion of *D. Liebrechtsiana* I have explained how it became entangled with this species. Dr. Knuth's founding of a new species, — *D. occidentalis,* — on material from the West Indies, including the type specimen of *D. rotundata,* is a curious divagation. Of Irvine's Dioscorea spp. in his « Plants of the Gold Coast » (1930, pp. 159-161), I assign n^os^ 1, 2, 3 and 4 to *D. cayenensis;* the 5th is *D. minutiflora,* as suggested (on p. 161).

As a preface to indicating the area in Africa over which *D. cayenensis* occurs, it is well to give a few facts about its very intense cultivation among the tribes of Southern Nigeria.

There the Ibos who are among the most expert of cultivators raise yam-hills 5-6 feet high (Irvine) and plant the sides with tubers they value less such as *Colocasia* (Forde in Geogr. Journ., XC, p. 32, 1936). A man of this tribe eats 4-10 yams a day which are boiled and pounded to a paste ; as he sits at dinner he has before him a large ball of this paste from which he pinches bits ; these he dips in a relish and swallows (Basgen, Among the Ibos of Nigeria, p. 53, 1921). Because the maintenance of the population depends so largely on the yam-crop, theft by a stranger used to be punished with tremendous severity. For the same reason the major religious festivals are dated (1) on the planting of the yams (2) on the staking of the new crop, and (3) on the eating of the first fruits (Partridge, Cross River natives, p. 264, 1905). Human sacrifice, even, was thought necessary to ensure the harvest (Talbot, Life in Southern Nigeria, 1923). The harvested yams are washed by the women and stacked by men and women on great racks of wooden poles and cross ties holding up to 10,000 tubers (Holland, MS diary). Forde reckons a family's yam patch at 3/5 of a hectare, and the hills on it at 2440.

From Southern Nigeria the importance of the yam crop decreases in all directions, but unevenly as one would expect, according to the rainfall which is over 2000 mm. when the highest cultivation is. This importance is much diminished when one travels as far from Nigeria as the Belgian Congo, particularly when one travels to the remoter parts; but it seems to be not small in the subprovince of Bas-Congo and so to extend into northern Angola. But yam cultivation is very unimportant towards the southeast and in adjoining Northern Rhodesia.

*D. cayenensis* is cultivated on the west coast of Africa as far north as Konakry in French Guinea. It has some importance in Sierra Leone and Liberia, and this importance increases to the Gold Coast and forward to Southern Nigeria; but away from the coast and its abundant rain *Ipomoca Batatas* tends to displace it. It is cultivated in the Ubangi-Shari Province of French Equatorial Africa, but not yet shown to be in the Anglo-Egyptian Sudan; it is cultivated and runs wild in Uganda, but not yet reported from Kenya. South of the line that these political units make it extends to Angola, Northern Rhodesia (very sparingly) and Nyassaland. It is in the Comoro islands and sparingly in Madagascar.

As to the Belgian Congo it is proved to occur at several places in the Province of Coquilhatville; to be grown in most parts of the Province of Léopoldville; to be raised in the Provinces of Lusambo and Élisabethville, but the records are few; and lastly no specimens have been seen from the province of Stanleyville. Certainly reports on the agriculture of this and various other parts of the Dependency mention yams as grown, and the yam most likely to be grown is this species; but the reports have not been circumstantiated by the collection of specimens.

18. **D. Lecardii** *De Wild.* in Ann. Mus. Congo, sér. 5, Bot., I, p. 19 (1903).

Syn.: *D. Mildbraedii* R. Knuth; *D. Zara* Baudon.

Widely in the savannah country which lies to the south of the Sahara this species exists. One may describe it as *D. abyssinica* adapted to a drier climate than *D. abyssinica* requires. It has harsher leaves and apparently is of lesser growth.

There is an entanglement regarding its botanical name which must be explained. Pax, when in 1893 he described his *D. sagitti-*

*folia*, cited as it Schweinfurth's n° 1712 and Lecard's n° 14. I have been favoured by Dr. Diels with a photograph of Schweinfurth's specimen and I find it to consist of new shoots with sagittate leaves, an imperfect specimen. In as much as Dioscoreas of the section Enantiophyllum if disturbed in new growth produce sagittate leaves on stems which if normal would bear cordate leaves, there is no reason why Schweinfurth's may not be a poor fragment of *D. abyssinica*. At any rate by the thinness of its leaf-blades it is not the species now under discussion. As to the other specimen which Pax quotes, evidence points to a misquotation of the number which should have been 214 and not 14; and Lecard's n° 214 is the type number of this species *D. Lecardii*. Pax confused the matter yet further, for he ascribed the flowers he had on Lecard's specimen to Schweinfurth's, which is flowerless and not by a long way near flowering. Surely we may dismiss the name *D. sagittifolia* from further consideration as a nomen confusum. The name *D. Lecardii* (De Wildeman actually wrote Lecardi) remains valid.

*D. Lecardii* varies not a little. Baudon indicated a number of races which he observed in French Equatorial Africa; these I prefer to group collectively under var. *Zara* and I think it may be convenient to separate this variety from the type thus:

Lower leaves shaped as those of *D. abyssinica* i. e. cordate, the distal sagittate ... ... ... ... ... ... ... ... ... ... ... ... ... ... v. *vera*.

All the leaves sagittate ... ... ... ... ... ... ... ... ... ... ... ... ... ... v. *Zara*.

As yet I have not seen Baudon's specimens. He describes them by the racial characters which those who eat the tubers use for recognition.

Dr. A. Chevalier suggests that *D. Lecardii* hybridizes with *D. abyssinica*. This which is possible, can be proved only in tropical Africa.

*D. Lecardii* occurs within the northern borders of the Belgian Congo, chiefly in the Province of Stanleyville. The most western locality recorded is on the Lower Uele (*Dewulf*, the specimen not quite typical) and the most eastern recorded, Faradje (*Lebrun*). Pittery collected at Bambesa a curious plant with red colour suffused through the foliage, which may be assigned provisionally to this species, particularly as Baudon defined some of his races by such colour.

19. **D. Claessensii** *De Wild.* in Ann. Mus. Congo, sér. 5, Bot., III, p. 358 (1912).

This rests on a single specimen obtained at Katake Kombe in the Province of Lusambo (*Claessens* 389) and nothing is known of its economic use.

20. **D. Pynaertii** *De Wild.* in Ann. Mus. Congo, sér. 6, III, p. 366 (1912).

Syn.: *D. praehensilis* Baker as regards C. Smith's specimen.

This species is separable from *D. minutiflora* only with difficulty. The first to collect it was Christen Smith. His specimen is not exactly localized; but as Tuckey's expedition on which he served, was unable to ascend the River Congo beyond the last rapid, it is certain that he obtained it on the lower part of the River. He died on board ship a few days after returning to the estuary, his collections unticketed. The next to collect it was Schweinfurth who had entered the area which is now the Belgian Congo at its north-eastern corner; at least Dr. R. Knuth claims that he collected it. He claims also that a specimen from Lomi in the south-eastern part of the Cameroons (*Mildbraed* n° 5224) is *D. Pynaertii* (in Engl., Pflanzenreich, IV-43, p. 305, 1924).

The Congo specimens known to me are : from the Province of Coquilhatville, subprovince of Ubangi-Congo, at Dundu Sana in native plantations (*Mortehan*), and in the subprovince of Tshuapa at Eala (*Pynaert*) ; from the Province of Léopoldville, subprovince of Bas-Congo on the lower course of the Congo river (*C. Smith*) and in Mayumbe (*J. de Briey*) ; from the Province of Stanleyville, subprovince of Kibali-Ituri, at Bumba to the north of Kibalu (*Schweinfurth*), between Mboga and Lesse in secondary forest (*Bequaert*) and at Mboga in abandoned cultivation (*Bequaert*) and also at Kalagwa in forest (*Bequaert*).

Mortehan states that the tubers are edible.

21. **D. minutiflora** *Engl.* in *Engl.*, Bot. Jahrb., VII, p. 332 (1886).

Syn.: *D. armata* De Wild.; *D. brevispicata* De Wild.; *D. Demeusei* De Wild. only as regards Demeuse's specimen; *D. ealaensis* De Wild.; *D. Ekolo* De Wild.; *D. Engbo* De Wild.; *D. grandebulbosa* R. Knuth; *D. hystrix* R. Knuth; *D. Lilcla* De Wild.; *D. Litoic* De Wild.; *D. multiflora* Pax by error for *D. minutiflora*;

*D. praehensilis* Durand & Schinz as regards the S. Thome plant; also of other authors who have followed, doubtfully of Benth.; *D. pynaertioides* De Wild.; *D. sp.* cf. *minutiflora* (Irvine, Plants of the Gold Coast, p. 161, 1930).

*D. minutiflora* does not extend beyond the copiously watered parts of tropical Africa and is absent from the east side of the continent. It is found in Sierra Leone plentifully and in the Cameroons whence its distribution is continuous to Uganda. It is abundant in the densely forested parts of the Belgian Congo e. g. the Provinces of Coquilhatville, Léopoldville and Stanleyville; but only one specimen has been brought from the Province of Lusambo and none from the Provinces of Costermansville and Élisabethville. It occurs in northern Angola and in the island of S. Thome.

Part of a tuber sent from Sierra Leone shows a woody mass spreading horizontally at the surface of the soil from the lower side of which softer tubers descend. These softer tubers can be eaten. It is probable that there is much variability in the underground parts and that younger plants may not have the same amount of woody tissue as that referred to, i. e. that it, like the defence of thorns, accumulates with age. The tubers may weigh several kilogrammes and men in dire need dig and eat them. Stuhlmann, travelling in 1894 in the extreme north-east of the Belgian Congo, saw his famishing porters dig and make what he calls a horrible meal of them (Mit Emin Pascha, p. 555, 1894). Their flesh was reddish, fibrous or woody and very bitter; it was rendered edible by boiling with a change of water. Dawe has recorded that the tribes just to the eastward of Stuhlmann's route likewise fall back on this plant in famine. Lebrun who collected it at Mongo in the Province of Coquilhatville, recorded that the tuber can be eaten. Claessens collecting in Stanleyville and Bonnivair at Eala in Coquilhatville, made the same comment.

The material of this species in herbaria is unsatisfactory. The collectors unaware of the need of leaves from all parts of the stem, and the stem itself at the base, and the desirability of some information about the underground parts, have sent in only such leaves as were in close association with the flowers. It is to me impossible to suggest varietal names, though I am certain that varieties will be found recognizable. Better and much more material should be collected.

It is evident that most of the leaves carry the acarodomatia which were first described by De Wildeman (see Burkill in Proc. Linn. Soc. Lond., session 151, p. 57, 1939).

22. **D. smilacifolia** *De Wild.* in Ann. Mus. Congo, sér. 2, Bot., I, p. 58 (1899).

Syn. : *D. Demeusei* De Wild. as regards Dewèvre's specimen n° 329 ; *D. echinulata* De Wild. ; *D. Flamigni* De Wild. ; *D. minutiflora* var. *Zenkeri* Harms ex Mildbr. ; *D. orbicularis* A. Chev., not of Hooker f. ; *D. praehensilis* Baker as regards Cummin's specimens, not of Benth.

This species is well marked, but clearly of close affinity to *D. minutiflora* with which it was at one time confused, so that its distribution is wrongly given in Engler's writings. Perhaps it hybridizes, like *D. minutiflora,* with species contributory to *D. cayenensis;* at any rate Dr. Louis's n° 5638 is a specimen of it which is not quite typical and suggests the possibility of hybridization.

The distribution of *D. smilacifolia* is very similar to that of *D. minutiflora,* but it seems to reach areas slightly drier than *D. minutiflora* reaches, such as the Ivory Coast whence Dr. A. Chevalier's records it ; and it occurs at some distance inland in the Gold Coast and Dahomey. The records of its occurrence in the Belgian Congo give to it there the same dispersal as *D. minutiflora,* but it has not been collected quite so freely in the Province of Coquilhatville and it seems to be rarer in Uganda.

The leaves carry acarodomatia.

The ethnologist, N. W. Thomas, collected it in Southern Nigeria as a famine food ; and Dr. Irvine says it may be eaten sometimes in the Gold Coast.

23. **D. Baya** *De Wild.* in Ann. Mus. Congo, sér. 5, Bot., III, p. 357 (1912).

This is an exceedingly interesting species because the texture of its sepals differs from that of any other species in its section ; they are scarious. Another feature of note is that the lower flowers on the male spikes fall as the upper enter into flowering. This deserves study in life.

To identify the female plant has been difficult at least with herbarium material. But it is thought that Dr. Louis's n° 9667 is it ; if so the dimensions of the capsules are as in *D. smilacifolia.*

Dr. Louis's n° 8425, which has foliage resembling that of *D. Baya* bears capsules with the proportions of these of *D. minutiflora* and is only doubtfully assigned to *D. Baya*. The plant which Dr. De Wildeman called *D. Baya* var. *cordata,* I exclude.

*D. Baya* was collected first by Gillet at Kisantu in the subprovince of Bas-Congo, the year being 1909. It was collected in the second place by Claessens, in 1910, at Bomane, a village facing the town of Basoko across the river Lulu at its mouth into the river Congo. In 1914 Dummer obtained it in Uganda and latterly it has been obtained by Gossweiler in northern Angola.

Except for Uganda and Northern Angola it is confined to the Belgian Congo. Within the Belgian Congo it occurs in the Provinces of Coquilhatville, Léopoldville and Stanleyville and has been collected at one place in the Province of Costermansville, namely Masisi in Kivu (*Bequaert,* n° 6397). It is not known to occur in the Province of Élisabethville.

De Giorgi says the tubers become enormous.

# RÉVISION

DES

# RHAMNACÉES

DU

# CONGO BELGE

PAR

**P. STANER.**

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La famille des Rhamnacées comprend, au Congo belge, des arbres, des arbustes dressés ou sarmenteux ou des lianes; les rameaux sont parfois pourvus d'épines ou même de vrilles. Les feuilles sont simples, stipulées, alternes, opposées ou subopposées, à réticulations penninerves ou palminerves. Les stipules sont petites et souvent caduques; elles sont parfois transformées en épines. Les fleurs sont groupées en fascicules, cymes, racèmes ou panicules; elles sont ordinairement hermaphrodites. Le calice est pourvu d'un tube obconique-turbiné et de 5 lobes triangulaires, valvaires dans le bouton et ordinairement étalés dans la fleur épanouie. Les pétales sont au nombre de 5; ils sont cuculliformes et coiffent chacun une étamine. Le disque existe dans presque toutes les espèces congolaises à l'exception du *Macsopsis Eminii;* il est périgyne, ou bien charnu et épais et remplissant la cavité du tube calycinal, ou bien annulaire, ou bien cupulaire et libre, ou bien couvrant les parois du tube calycinal; il est entier ou lobé, glabre ou tomenteux. L'ovaire est sessile, libre ou immergé dans le disque, totalement supère ou plus ou moins conné avec le tube calycinal; il contient de 1 à 4 loges à 1 ovule par loge; le style est dressé souvent très court, ou bien simple et à stigmate étalé ou bien

## RÉPARTITION GÉOGRAPHIQUE DES RHAMNACÉES AU CONGO BELGE.

| ESPÈCES | District côtier | Mayumbe | Bas-Congo | Kasaï | Bas-Katanga | Haut-Katanga | Grands Lacs | Ruanda-Urundi | Lac Albert | Haut-Ubangi et Uele | Forestier Central |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Colubrina ferruginosa* . . | — | — | — | — | — | — | — | — | — | — | + |
| *Gouania longipetala* . . . | — | + | + | + | + | — | — | — | — | + | + |
| *Gouania longispicata*. . . | — | - | — | - | — | — | + | + | + | + | — |
| *Helinus mystacinus* . . . | — | — | — | — | — | — | + | + | — | — | — |
| *Helinus scandens* . . . . | — | — | + | — | — | + | — | — | — | — | — |
| *Lasiodiscus fasciculiflorus* . | — | — | — | — | — | — | — | — | — | — | + |
| *Lasiodiscus Gillardini* . . | — | — | — | + | — | — | — | — | — | — | — |
| *Lasiodiscus Mannii* . . . | — | — | — | + | — | — | — | — | — | — | + |
| *Lasiodiscus Mildbraedii*. . | — | — | — | — | — | | — | — | — | — | + |
| *Maesopsis Eminii* . . . . | — | + | + | — | + | — | — | — | | + | + |
| *Rhamnus Mildbraedii* . . | — | — | — | — | — | — | — | + | — | — | — |
| *Rhamnus prinoides* . . . | — | — | — | — | — | - | + | + | — | — | - |
| *Scutia myrtina* . . . . | — | — | — | — | | - | + | — | + | — | - |
| *Ventilago africana* . . . | — | — | — | + | — | — | + | — | — | - | + |
| *Ziziphus mauritiana*. . . | — | — | — | — | + | + | — | — | + | + | — |

bi-trifide et à stigmate non étalé. Le fruit est une capsule ou une drupe.

Cette famille compte 15 espèces au Congo belge ; nous en donnons la répartition géographique dans le tableau ci-annexé.

## Clef analytique des genres.

I. Fruits drupacés :

A. Rameaux pourvus d'épines :

1. Ovaire semi-infère; fruit à une loge; feuilles à réticulation palminerve ... ... 2. *Ziziphus.*
2. Ovaire supère; fruit à 2 loges; feuilles à réticulation penninerve ... ... ... ... ... 5. *Scutia.*

B. Rameaux sans épines :

1. Ovaire à une loge; feuilles pourvues de glandes à la face inférieure des dents. 3. *Maesopsis.*
2. Ovaire à 3-4 loges; feuilles sans glandes à la face inférieure des dents ... ... ... 4. *Rhamnus.*

II. Fruits capsulaires :

A. Fruits non ailés :

1. Plantes sans vrilles :
   *a.* Feuilles alternes ... ... ... ... ... ... ... 6. *Colubrina.*
   *b.* Feuilles opposées ... ... ... ... ... ... ... 7. *Lasiodiscus.*
2. Plantes pourvues de vrilles ... ... ... ... ... 8. *Helinus.*

B. Fruits ailés :

1. Ailes au nombre de 3, latérales... ... ... ... 9. *Gouania.*
2. Aile unique, terminale ... ... ... ... ... ... ... 1. *Ventilago.*

## Clef analytique basée sur les caractères végétatifs.

I. Feuilles à dents marginales pourvues chacune d'une glande à la face inférieure... ... ... ... ... ... ... ... ... *Maesopsis.*

II. Feuilles à dents marginales non pourvues de glande:

A. Feuilles à réticulation palminerve :

1. Feuilles opposées; rameaux non épineux... ... *Lasiodiscus.*
2. Feuilles alternes; rameaux épineux ... ... ... *Ziziphus.*

B. Feuilles à réticulation penninerve :

1. Feuilles opposées :
   *a.* Rameaux pourvus de crochets ... ... ... ... *Scutia.*
   *b.* Rameaux sans crochets... ... ... ... ... ... ... *Lasiodiscus.*
      α. Rameaux pourvus de vrilles :
         + Feuilles entières sur les bords ... ... *Helinus.*
         ++ Feuilles dentées sur les bords ... ... *Gouania.*

β. Rameaux sans vrilles :
+ Pétioles de plus de 2 cm. de long... *Colubrina.*
++ Pétioles de moins de 1 cm. de long :
• Arbre ou arbuste ... ... ... ... ... *Rhamnus.*
•• Liane ligneuse ... ... ... ... ... ... *Ventilago.*

## Tribu 1. — VENTILAGINEAE.

### 1. — VENTILAGO *Gaertn.*

Arbuste ou arbre sarmenteux. Feuilles alternes, penninerves. Stipules petites, caduques. Fleurs fasciculées, constituant des racèmes ou des panicules axillaires ou terminales. Calice à 5 lobes étalés. Pétales 5, cuculliformes. Étamines 5, adnées à la base des pétales et les dépassant à peine en hauteur ; connectif proéminent. Disque obscurément 5-lobé. Ovaire globulaire immergé dans le disque, semi-infère, à 2 loges ; style très court, bifide. Capsule monosperme indéhiscente, globuleuse, plus ou moins immergée dans le tube calycinal, prolongée vers le sommet en une aile oblongue et coriace.

Ce genre comprend principalement des espèces asiatiques et australiennes ; il n'existe qu'une espèce africaine.

**Ventilago africana** *Exell,* Journ. Bot., LXV, Suppl. I, p. 80 (1927).

*V. leiocarpa* auct., non Benth. ; Th. et Hél. Dur., Syll., 1909, p. 103 ; De Wild., Bull. Jard. Bot. État, Brux., V, p. 332 (1919).

*V. madraspatana* Engl., Pflanzenw. Afr., III, 2, p. 310 (1921), non Gaertn.

*Grande liane* à jeunes rameaux tomenteux gris ou bruns et à rameaux adultes glabrescents ou glabres. *Feuilles* pétiolées, à pétiole tomenteux ou glabrescent de 2-5 cm. de long ; limbe chartacé oblong-lancéolé, elliptique-ovale, obtus ou arrondi et dyssymétrique à la base, cunéiforme-obtus ou acuminé-obtus au sommet, ondulé ou denticulé sur les bords, de 2-10 cm. de long et de 1-4 cm. de large, glabre ou glabrescent à la face supérieure, pubescent sur les nervures à la face inférieure, nervures latérales 6-7 paires ; stipules linéaires-lancéolées de plus ou moins 1.5 mm. de long. *Fleurs* (fig. 45) fasciculées à l'aisselle des feuilles ou constituant au sommet des rameaux d'amples racèmes ou des panicules ; rameaux brièvement tomenteux ; pédicelles de 2.5 mm. de long, tomenteux ou glabrescents ; bractées linéaires de 1-2 mm. de long ; sépales

triangulaires de 1.5 mm. de long et de 1.5 mm. de large, tomenteux à la face extérieure, glabres à la face intérieure ; pétale obovale de 1.5 mm. de long et de 1 mm. de large à bords membraneux ;

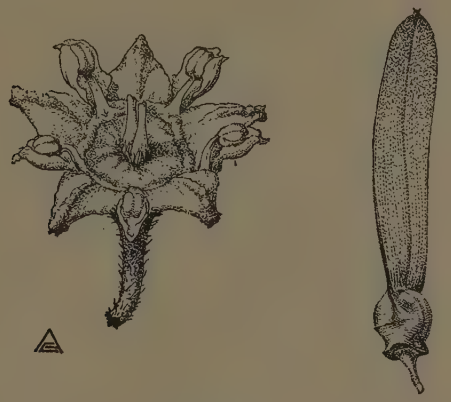

Fig. 45. — *Ventilago africana* Exell : fleur (× 8) ; fruit (× 1.5).

disque pubescent, parfois glabrescent, de 3 mm. de diamètre ; ovaire velu à la naissance du style, style de 1-1.5 mm. de long. *Fruit* (fig. 45) jaune-fauve et velu à l'état jeune, glabrescent à l'état adulte, de 4.5-5 cm. de long et de 1-1.2 cm. de large.

District du Kasaï : Madibi, 1910, *Sapin* Z 7 ; entre la Loange et la Lulua, 1922, *Vanderyst* 12282, 12323 et 12535.

District Forestier Central : Lukasa-Bumba, 1896, *Dewèvre* 884 ; Mobwasa, 1910, *Claessens* 661 ; Avakubi, forêt aux bords de l'Ituri, 1914, *Bequaert* 1797 ; Kabongema, 1921, *Claessens* 231 ; Eala, berge inondée de la Ruki, 1936, *Louis* 2040 ; Yangambi, forêt ripicole, 1938, *Louis* 3269, 9325, 10617, 10672 et 11442.

District des Lacs Édouard et Kivu : Rutshuru, 1914, *Bequaert* 6263 ; id., 1937, *Ghesquière* 3796 et 3833.

*Nom vernaculaire :* Inaolo a Lumwemwe (dial. Turumbu, fide *Louis*).

*Observations.* — 1. — Le *V. leiocarpa* Benth. est une espèce asiatique nettement différente de l'espèce africaine ; aussi n'avons-nous pas hésité à adopter le nom qu'Exell avait donné à celle-ci.

2. — Cette liane est répandue dans toute l'Afrique tropicale et paraît se complaire dans les forêts marécageuses, où elle prend un développement extraordinaire.

## Tribu 2. — ZIZIPHEAE.

### 2. — ZIZIPHUS *Mill.*

Arbuste sarmenteux. Feuilles alternes palminerves. Stipules épineuses. Fleurs en cymes axillaires. Calice à 5 lobes étalés. Pétales 5. cuculliformes. Étamines 5, cachées dans la coiffe des pétales. Disque aplati, pentagonal. Ovaire immergé dans le disque et adné avec celui-ci à la base, semi-infère, à 2 loges ; style très court bifide. Drupe charnue, globuleuse, à 1 loge et à 1 graine.

Ce genre comprend de nombreuses espèces asiatiques et américaines ; des rares espèces africaines, seul le *Z. mauritiana* Lam. existe au Congo belge.

**Ziziphus mauritiana** *Lam.*, Encycl. Méth. Bot., III, p. 319(1789). *Z. jujuba* Lam., l. c., non Mill. ; Th. et Hél. Dur., Syll., 1909, p. 104.

*Z. jujuba* var. *obliquifolia* Engl. ex De Wild., Ét. Fl. Kat., I, p. 54 (1903) ; Th. et Hél. Dur., Syll., 1909, p. 104 ; De Wild., Ét. Fl. Kat., II, p. 107 (1913) ; id., Bull. Soç. Scient. Brux., XXXVII, p. 59 (1913) ; id., Pl. Bequaert., II, p. 80 (1923) ; id., Contr. Fl. Kat., p. 120 (1921) ; id., Contr. Fl. Kat., Suppl. I, p. 45 (1927) ; De Wild. et Staner, Contr. Fl. Kat., Suppl. IV, p. 48 (1932).

*Petit arbre* ou arbuste à rameaux tomenteux. *Feuilles* (fig. 46) alternes pétiolées, à pétiole tomenteux de 5-10 mm. de long ; limbe coriace elliptique ou ovale, dyssymétrique, arrondi à la base, obtus ou arrondi au sommet, denticulé sur les bords, de 3.5-12 cm. de long et de 2.5-6 cm. de large, glabre ou éparsément pubescent à la face supérieure, tomenteux à la face inférieure, à 3-5 nervures basilaires et à 1-2 paires de nervures latérales, nervures secondaires visibles à la face inférieure ; stipules épineuses recourbées. *Fleurs* en cymes bipares à l'aisselle des feuilles atteignant 3 cm. de long, à rameaux tomenteux, pédicelles tomenteux de 1-2 mm. de long, bractées linéaires de 2-3 mm. de long ; calice tomenteux à lobes triangulaires de 1.5 mm. de long et de large ; pétales cucullés de 1.5 mm. de long couvrant chacun une anthère pourvue d'un filet ;

disque glabre de 2 mm. de diamètre; ovaire glabre, style à peine proéminent. *Fruits* drupacés, plus ou moins sphériques, de 3-4 cm. de diamètre.

Fig. 46. — *Ziziphus mauritiana* Lam. : rameau feuillu (× 1).

District du Bas-Katanga : plaine de la Ruzizi, environs de Luvungi, 1926, *Robyns* 2519 ; Lomami, 1931, *Quarré* 2742.

District du Haut-Katanga : Mtowa, 1895, *Descamps;* Pweto-Lac Moero, 1899, *Chargeois;* Lukafu, 1899, *Verdick* 177 et 224; Bukama, 1911, *Bequaert* 119 ; Élisabethville, 1911, *Hock;* id., 1912, *Homblé* 100, 152 et 303 ; Katentania, 1912, *Homblé* 720 ; vallée de Kapiri, 1913, *Homblé* 1278 ; Baudouinville, vers 1,200 m. d'alt., 1926, *Robyns* 2240 ; sources de la Kafemba, 1928, *Ritschard* 1523 et 1524 ; Élisabethville, 1934, *Quarré* 3754 ; Biano, 1934, *Lynes* 581 ;

Kasenga, 1934, *Lynes* 460 ; Élisabethville, 1934, *Quarré* 4266 et 5080.

District du Lac Albert : Ishwa, 1934, *Brédo* 1299, 1407 et 1576 ; Mahagi-port, 1934, *Brédo* 1628 ; Kasenyi, 1935, *Brédo* 1897 ; Mont Hawa, 1938, *Belot* 18.

District du Haut-Ubangi et Uele : Doruma, 1936, *De Graer* 664.

*Noms vernaculaires :* Bangolondima (dial. Zande, fide *De Graer*) ; Kankole (dial. Kiluba, fide *Homblé)* ; Kangua (dial. Kikemba, fide *Robyns*) ; Kankono (fide *Verdick* et *Homblé*) ; Mukona-kona (fide *Homblé*) ; Lunfunga (dial. Kitabwa, fide *Homblé*) (dial. Kibemba, fide *Ritschard*) ; Puriti (dial. Kakwa, fide *Belot*).

*Observation.* — Cette espèce est répandue dans toutes les régions tropicales du globe. Au Congo, elle est nettement localisée au Katanga et aux environs du Lac Albert.

### 3. — **MAESOPSIS** *Engl.*

Arbre. Feuilles alternes, subopposées ou opposées, pourvues de glandes sur chaque dent du limbe ; penninerves. Stipules petites, caduques. Fleurs en cymes axillaires. Calice à 5 lobes étalés. Pétales 5 cuculliformes. Étamines 5 cachées sous les pétales. Disque 0. Ovaire supère à 1 loge uni-ovulée, caché dans le tube du calice mais sans y adhérer ; style indivis surmonté d'un stigmate étalé à bords dentés. Drupe à 1 loge monospermée.

Ce genre est strictement africain et la seule espèce qu'il compte est très répandue au Congo.

**Maesopsis Eminii** *Engl.,* Pflanzenw. Ost-Afr., C, p. 255 (1895) ; *Mildbraed,* Wiss. Erg. Zweit. Deutsch. Zentr.-Afr.-Exped., 1910-11, II, Bot., p. 33 (1922) ; *De Wild.,* Pl. Bequaert., IV, p. 333 (1928) ; *Delevoy,* Ess. For. Kat., II, p. 305 (1922).

*M. berchemoides* Pierre, Bull. Soc. Linn. Paris, p. 1270 (1897).

*Arbre* pouvant atteindre 35 m. de haut, à fût droit allant jusque 23 m. de haut et 1.20 m. de circonférence ; rameaux jeunes densément et brièvement velus, devenant glabres. *Feuilles* (fig. 47) opposées-subopposées ou alternes, pétiolées, pétiole tomenteux de 5-15 mm. de long ; limbe oblong-lancéolé, arrondi ou subcordé à la base, acuminé aigu au sommet, pourvu sur les bords de 6-8 dents tronquées au sommet et munies chacune d'une petite glande à la face inférieure, de 8-15 cm. de long et de 3-5 cm. de large, glabre et

brillant à la face supérieure, éparsément pubescent sur les nervures à la face inférieure, 7-8 paires de nervures latérales proéminentes à la face inférieure et pourvues d'une glande à leur insertion avec la nervure médiane, nervures secondaires et tertiaires visibles sur les 2 faces ; stipules subulées de 5-8 mm. de long, velues. *Fleurs* disposées en cymes bipares axillaires de 2-4 cm. de long, rameaux bruns

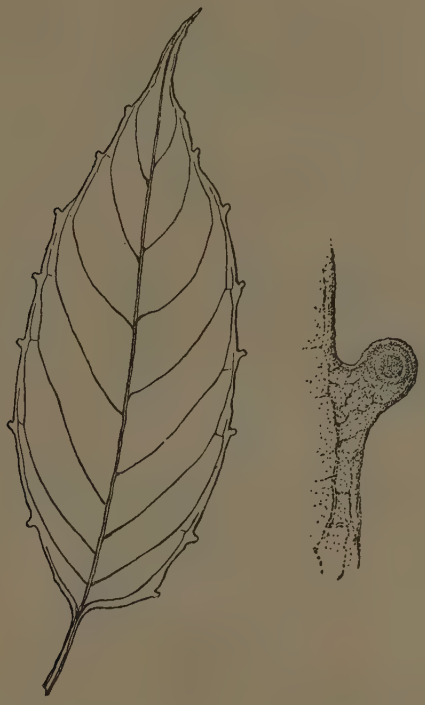

Fig. 47. — *Maesopsis Eminii* Engl. : feuille (× 1) ; glande de la feuille (× 10).

tomenteux ; pédicelle brun tomenteux de 1-2 mm. de long ; calice velu à lobes triangulaires de 2 mm. de long et de 1.5 mm. de large ; pétales en forme de coiffe de 1 mm. environ de diamètre recouvrant chacun une anthère sessile ; ovaire glabre, style de 1 mm. de long couronné d'un stigmate étalé à bords dentés. *Fruits* drupacés rouges, puis noirs, glabres, de ± 3 cm. de long et de ± 2 cm. de large.

District du Mayombe : sine loco, 1912, *de Bricy* 16.

District du Bas-Congo : Kisantu, 1904, *Gillet* 3776 et 3793 ; id., 1909, *Gillet ;* Tumba, 1913, *Verschueren* 691.

District Forestier Central : Nouvelle-Anvers, 1900, *Durivier* 26 : id., 1913, *De Giorgi* 253 ; Eala, 1913, *Nannan* 42 ; Bikoro, 1920, *Goossens* 1519 ; Eala, 1921, *Corbisier* 1642 ; Lokolenge, 1927, *Ghesquière ;* rivière Tshuapa, 1935, *Dubois* 673 ; Yangambi, 1935-1939, *Louis* 672, 1774, 3161, 3931, 6769, 7129, 7193, 8661, 10437 et 11304 : Bumba, 1910, *Mildbraed* 3995 (Herb. Berol.).

District du Haut-Ubangi et Uele : environs de Bondo, 1935, *Dewulf* 654.

District du Bas-Katanga : Kabinda, 1922, *Vermeersch ;* Kaniama, 1934, *Herman* 2037.

*Noms vernaculaires :* Nzonzala ou Mbubu (fide *de Bricy*) ; Kidianga (fide *Gillet*) ; Kanga (fide *Duvivier*) ; Dogo (fide *De Giorgi*) ; Bosangu (fide *Nannan*) ; Bokiliungu (dial. Kundu, fide *Goossens*) ; Isongu (fide *Corbisier*) ; Mboka (dial. Zande, fide *Dewulf*) ; Ndunga (fide *Vermeersch*) ; Kalungamushi (fide *Herman*) ; Okwongo, Bokwongo ou Bofambu (dial. Turumbu, fide *Louis*).

*Observation.* — Cette essence est très répandue dans toute l'Afrique tropicale ; elle est utilisée comme essence de reboisement, notamment au Lomami.

## Tribu 3. — RHAMNEAE.

### 4. — RHAMNUS *L.*

Arbre ou arbuste. Feuilles alternes, penninerves. Stipules petites, caduques. Fleurs en fascicules axillaires. Calice à 5 lobes dressés ou étalés. Pétales 5, cuculliformes. Étamines 5. Disque tapissant le tube du calice. Ovaire supère, ovoïde, à 3-4 loges ; style 3-4 fide. Drupe charnue à 2-4 graines.

Ce genre, de répartition mondiale, n'est connu que par deux espèces au Congo belge, à savoir : *R. prinoides* L'Hérit. et *R. Mildbraedii* Engl.

## Clef des espèces.

I. Feuilles à pétiole de 5-12 mm. de long ; pédicelle de ± 10 mm. de long ... ... ... ... ... ... ... ... ... 1. *R. prinoides.*

II. Feuilles à pétiole de 2 mm. de long ; pédicelle de 1-2 mm. de long... ... ... ... ... ... ... ... ... ... 2. *R. Mildbraedii.*

## Description des espèces.

1. **Rhamnus prinoides** *L'Hérit.*, Sert. angl., p. 6 et tab. 9 (1788) ; *Engl.* in *Mildbr.*, Wiss. Erg. Deutsch. Zentr.-Afr.-Exp., 1907-08, Bot., II, p. 489 (1912) ; *R. E. Fries,* Wiss. Erg. Schwed. Rhod.-Kongo Exp., 1911-12, I, p. 133 (1914) ; *De Wild.*, Pl. Bequaert., II, p. 80 (1920) ; *Lebrun,* Ess. forest., Bruxelles, 1935. p. 148.

*Petit arbre* ou arbuste à rameaux pubescents à l'état jeune, glabres à l'état adulte. *Feuilles* pétiolées, à pétiole pubérulent ou glabre, de 5-12 mm. de long ; limbe chartacé, elliptique-oblong ou oblong-lancéolé, arrondi ou obtus à la base, acuminé-aigu au sommet, finement denticulé, de 2-10 cm. de long et de 1.5-3.5 cm. de

Fig. 48. — *Rhamnus prinoides* L'Hérit. : fleur (× 8).

large, glabre ou à quelques poils épars sur les nervures à la face inférieure, à 5-7 paires de nervures latérales, stipules triangulaires lancéolées, aiguës, pubérulentes, de ± 2 mm. de long. *Fleurs* (fig. 48) fasciculées par 2 à 10 à l'aisselle des feuilles, pédicelle grêle, éparsément pubérulent de ± 10 mm. de long ; calice de 2.5-3 mm. de long, à lobes triangulaires à peu près aussi longs que

le tube et éparsément ciliés ; pétales spatulés de ± 1 mm. de long ; disque glabre de ± 2.5 mm. de diamètre ; ovaire glabre. *Fruits* drupacés de 5 mm. de diamètre, à pédicelle de ± 20 mm. de long.

District des Lacs Édouard et Kivu : Ruwenzori, Butagu, vers 2,500 m. d'alt., 1908, *Mildbraed* 2526 (Herb. Berol.) ; id., vers 2,300 m. d'alt., 1914, *Bequaert* 3775 ; id., vers 2,000 m. d'alt, *Humbert* 8881 ; id., 1932, *Hauman* 32 (Herb. Univ. Brux.) ; Angi, 1914, *Bequaert* 5770 ; Mukule, 1914, *Bequaert* 5878 ; Rutshuru, 1914, *Bequaert* 6205 ; lac Mokoto, Mts Dalingi, vers 2,200 m. d'alt., 1928, *Scaetta* 334 ; plaine de lave entre les lacs Kivu et Édouard, vers 1,500 m. d'alt., 1929, *Humbert* 7876 ; Rutshuru, 1937, *Ghesquière* 4286 ; id., 1937, *Lebrun* 8311 ; Mushumangabo, 1937, vers 2,100 m. d'alt., 1937, *Lebrun* 7183 ; volcan Nyamlagira, vers 1,780 m. d'alt., 1932, *Lebrun* 4926 ; volcan Niragongo, vers 2,800 m. d'alt., 1907, *Mildbraed* 1331 ; volcan Sabinio, vers 3,000 m. d'alt., 1907, *Mildbraed* 1731 ; volcan Karisimbi, 1907, *Mildbraed* 1498 (Herb. Berol.) ; volcan Niragongo, vers 3,000 d'alt., 1911, *R. E. Fries* 1689 (Herb. Upps.).

District du Ruanda-Urundi : entre Shangugu et Usumbura, 1925, *Claessens*.

*Observation.* — Cette espèce est nettement localisée aux régions montagneuses du Congo oriental. On la signale également depuis l'Abyssinie jusqu'au Natal, en Angola et dans les montagnes du Cameroun.

2. **Rhamnus Mildbraedii** *Engl.*, Bot. Jahrb., XL, p. 553 (1908).

*Arbuste* subsarmenteux, à rameaux étalés horizontalement et légèrement incurvés, couverts de poils courts apprimés. *Feuilles* brièvement pétiolées, à pétiole pubescent de 2 mm. de long ; limbe subcoriace, étalé, oblong, rétréci vers le sommet, mucronulé, crénelé sur les bords, à crénelures étroites et apiculées, de 3-5 cm. de long et de 1.5-2 cm. de large, pubescent sur les nervures, à 5 nervures latérales de chaque côté de la nervure médiane. *Fleurs* fasciculées par 2-3 à l'aisselle des feuilles supérieures, à pédicelle gris-velu de 1-2 mm. de long ; calice à dents triangulaires de 1 mm. de long et de large et à tube turbiné de même longueur ; pétales spatulés plus courts que les dents du calice.

District du Ruanda-Urundi : Buganza, au Sud du Lac Mohasi, dans une galerie forestière d'une steppe à Acacia, 1907, *Mildbraed* 593 (Herb. Berol.).

*Observation.* — Cette espèce semble endémique au Ruanda.

### 5. — **SCUTIA** *Comm.*

Arbre ou arbuste, à rameaux pourvus d'épines axillaires crochues. Feuilles opposées ou subopposées, penninerves. Stipules petites, caduques. Fleurs en glomérules axillaires. Calice à 5 lobes étalés. Pétales 5, cuculliformes. Étamines 5. Disque étroitement appliqué contre l'ovaire. Ovaire supère à 2 loges ; style indivis, terminé par un stigmate très vaguement bilobé. Drupe à 2 loges monospermes.

Les espèces de ce genre sont toutes tropicales, seul le *S. myrtina* Merril est africain.

**Scutia myrtina** *(Burm. f.) Merrill,* Philipp. Journ. Sc., XIX, p. 363 (1921) ; *Lebrun,* Ess. forest., Bruxelles, 1935, p. 149.

Fig. 49. — *Scutia myrtina* (Burm. f.) Merrill : rameau feuillu (× 1); fleur (× 8).

*Rhamnus myrtinus* Burm. f., Fl. Ind., p. 60 (1768).

*Scutia indica* Brongn., Ann. Sc. Nat., I, p. 10 (1827) ; Engl. in Mildbr., Wiss. Erg. Deutsch. Zentr.-Afr.-Exp., 1907-08, Bot., II, p. 488 (1912).

*S. Commersonii* Brongn., l. c.

*Petit arbre* ou arbuste sarmenteux à rameaux glabres, anguleux à l'état jeune, pourvus d'épines axillaires crochues. *Feuilles* (fig. 49) pétiolées, à pétiole glabre de 4-8 mm. de long ; limbe coriace, oblong, ovale, elliptique-lancéolé ou obovale, cunéiforme, aigu, obtus ou arrondi à la base, acutiuscule-mucroné, acuminé, obtus ou même émarginé au sommet, entier ou très faiblement et irrégulièrement crénelé sur les bords, de 1.5-6 cm. de long et de 1-2.5 cm. de large, glabre, luisant en-dessus, 5-8 paires de nervures latérales ; stipules triangulaires, aiguës au sommet, scarieuses, de 2 mm. de long. *Fleurs* (fig. 49) subsessiles, groupées en glomérules axillaires denses, pédonculés, à pédoncule de ± 5 mm. de long ; bractées subulées, minuscules ; calice infundibuliforme, de ± 4 mm. de long, à 5 lobes triangulaires de ± 2 mm. de long, pruineux à la face externe, glabres à la face interne ; pétales rhombiformes, échancrés au sommet ; disque charnu enveloppant l'ovaire, de ± 1 mm. de diamètre ; ovaire glabre. *Fruit* drupacé, glabre, subglobuleux de ± 8 mm. de diamètre.

District du Lac Albert : Djugu, vers 1,780 m. d'alt., 1931, *Lebrun* 3914 ; Kasenyi, 1935, *Brédo* 1907 et 1970bis.

District des Lacs Édouard et Kivu : vallée de la Semliki, 1908, *Mildbraed* 1996 et 2121 (Herb. Berol.) ; Beni, vallée de la Semliki, 1914, *Bequaert* 3389 ; Beni-Kasindi, steppe, 1914, *Bequaert* 5226 ; Rutshuru, 1914, *Bequaert* 6199, 6208 ; volcan Niragongo, vers 2,400 m. d'alt., 1929, *Humbert* 7946 ; entre Beni et le Ruwenzori, vers 1,000 m. d'alt., 1931, *Lebrun* 4605 ; entre Kasindi et Lubango, vers 2,000 m. d'alt., 1931, *Lebrun* 4849 ; Sake, berge du Lac, vers 1,460 m. d'alt., 1932, *Lebrun* 5063 ; Rutshuru, 1937, *Ghesquière* 3778 ; Ruindi, vers 1,000 m. d'alt., 1937, *Lebrun* 7975 et 8024 ; lac Muguga, vers 1,500 m. d'alt., 1937, *Lebrun* 8813.

*Nom vernaculaire :* Motu (dial. Kinyaruanda, fide *Ghesquière*).

*Observations.* — 1. — Cette espèce est très reconnaissable à ses feuilles opposées ou subopposées et ses rameaux pourvus d'épines crochues.

2. — Elle possède une aire de dispersion très vaste qui s'étend de l'Afrique orientale à Madagascar, aux îles Mascarènes et à l'Asie tropicale.

### 6. — COLUBRINA *Brongn.*

Arbre ou arbuste sarmenteux. Feuilles alternes, penninerves. Stipules petites, caduques. Fleurs en ombelles axillaires. Calice à 5 lobes étalés. Pétales 5 cuculliformes. Étamines 5, cachées dans la coiffe des pétales. Disque aplati, pentagonal. Ovaire immergé dans le disque, semi-infère à 3 lobes : style 3-fide. Capsule globulaire, à déhiscence septicide, à 3 coques monospermes.

Le *C. ferruginosa* Brongn. est la seule espèce que l'on rencontre en Afrique, les autres étant asiatiques ou américaines.

**Colubrina ferruginosa** *Brongn.*, Ann. Sc. Nat., I, p. 369 (1827).

*Petit arbre* à rameaux jeunes roux tomenteux et à rameaux adultes glabrescents. *Feuilles* pétiolées, à pétiole roux tomenteux de 20-30 mm. de long ; limbe elliptique-ovale, cunéiforme obtus ou aigu, parfois arrondi et légèrement dyssymétrique à la base, atténué

Fig. 50. — *Colubrina ferruginosa* Brongn. : fleur (× 8).

obtus au sommet, ondulé sur les bords, de 7-19 cm. de long et de 3-10 cm. de large, glabre ou éparsément pubescent à la face supérieure, ferrugineux-tomenteux sur les nervures à la face inférieure, 6-8 paires de nervures latérales, très proéminentes ainsi que les nervures secondaires à la face inférieure ; stipules ferrugineuses tomenteuses, lancéolées, de ± 5 mm. de long. *Fleurs* (fig. 50) groupées en ombelles axillaires denses pédonculées ; pédoncule de

5-10 mm., à indûment très dense et ferrugineux, rapidement caduc ; pédicelles ferrugineux tomenteux, de 7-8 mm. de long, accrescent après l'anthèse ; bractées ferrugineuses tomenteuses, linéaires, de ± 5 mm. de long ; calice ferrugineux-tomenteux à lobes triangulaires de 2 mm. de long et de large ; pétales spatulés de 2 mm. de long et de 0.5 mm. de large ; disque glabre de 3 mm. de diamètre ; ovaire glabre, style de 1.5 mm. à parties libres réfractées. *Fruits* capsulaires, glabrescents, obovoïdes, de 7-8 mm. de diamètre.

District Forestier Central : Eala, petit arbre des anciennes cultures indigènes, 1932, *Corbisier* 1223.

*Nom vernaculaire:* Boeko (fide *Corbisier*).

*Observation.* — Cette espèce asiatique a été introduite au Jardin Botanique d'Eala comme plante ornementale. Le fait de la retrouver déjà dans les « anciennes cultures indigènes » prouve qu'elle est devenue subspontanée. C'est la raison pour laquelle nous tenons à la signaler.

### 7. — LASIODISCUS *Hook. f.*

Arbre ou arbuste. Feuilles opposées, palminerves ou penninerves. Stipules petites caduques et intrapétiolaires. Fleurs en ombelles, en fascicules ou en cymes axillaires. Calice à 5 lobes dressés, étalés ou réfléchis. Pétales 5 concaves. Étamines 5. Disque aplati, pentagonal. Ovaire immergé dans le disque, semi-infère, à 3 loges uniovulées ; style 3-fide. Capsule globuleuse 3-coccée ; coques monospermes indéhiscentes.

Les espèces de ce genre sont strictement africaines, sauf le *L. Pervillei* Baill. que l'on rencontre à Madagascar.

#### Clef des espèces congolaises.

I. Feuilles à réticulation palminerve ... ... ... ... ... 1. *L. Gillardini.*

II. Feuilles à réticulation penninerve :

A. Inflorescence en ombelles fasciculées, de 10-15 mm. de long ... ... ... ... ... ... ... ... ... ... ... ... ... ... 2. *L. fasciculiflorus.*

B. Inflorescence en cymes bipares, de 4-24 cm. de long :

1. Feuilles dyssymétriques à la base ; pétiole de 5 mm. de long ; pédicelle de 10-20 mm. de long ; style proéminent ; base du style glabre... ... ... ... 3. *L. Mildbraedii.*

2. Feuilles non dyssymétriques à la base ; pétiole de 10-12 mm. de long ; pédicelle de 5 mm. de long ; style à peine visible ; base du style velue ... ... 4. *L. Mannii.*

1. **Lasiodiscus Gillardini** *Staner* nov. sp. ; ab aliis speciebus foliis palminervibus primo aspectu distincta.

*Arbor parva,* ramulis teretibus novellis dense breviterque brunneo-pilosis adultis glabratis. *Folia* (fig. 51) petiolata, petiolo brun-

Fig. 51. — *Lasiodiscus Gillardini* Staner : rameau feuillu (× 1).

neo-velutino, 5-10 mm. longo ; lamina chartacea, oblongo-lanceolata, basin versus rotundata vel rare obtusa, apicem versus acuto-acuminata, margine undulata, 4-14 cm. longa et 1.5-5 cm. lata, supra glaberrima subtus secus nervos sparse pilosa, 3 nervis basilaribus supra immersis subtus prominentibus, nervis reliquis venisque

utrinque paullum prominulis ; stipulae lanceolatae, mox deciduae, ± 5 mm. longae et ± 2.5 mm. latae, extus brunneo-hirsutae. *Flores* (fig. 52) 10-20 in umbellas axillares longe pedunculatas dispositi,

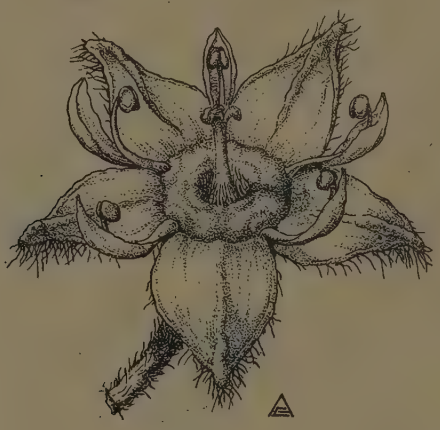

Fig. 52. — *Lasiodiscus Gillardini* Staner : fleur (× 8).

pedunculis 3-6 cm. longis, brunneo-hirsutis, bracteis lanceolatis, ± 5 mm. longis et ± 2.5 mm. latis, extus brunneo-hirsutis, pedicellis 7-15 mm. longis, griseo-tomentosis ; sepala ovato-triangularia membranacea, apice acuta, ± 3 mm. longa et ± 2.5 mm. lata, extus brunneo-hirsuta, intus carinata ; petala cucullata, 3 mm. longa et 1 mm. lata, discus glaber, 2 mm. diametens ; ovarium apice villosum, stylo ± 2 mm. longo, parte libera 0.5 mm. longa.

District du Kasaï : Makumbi, territoire Tshikapa, versant de la vallée du Kasaï, forêt, étage dominé, sol argileux, arbre de 8 m. de haut et de 0.20 m. de diamètre, écorce gris clair, fleurs blanches, 1938, *Gillardin* 351 (type).

*Noms vernaculaires :* Kabukole ou Tshimpatshanga (dial. Lulua, fide *Gillardin*).

*Observation.* — Cette espèce nouvelle est la seule du genre dont les nervures soient palminerves. Les feuilles sont des plus caractéristiques ; comme elles sont opposées et à 3 nervures basilaires, on pourrait facilement confondre la plante avec un *Strychnos* ou un *Memelycon*.

2. **Lasiodiscus fasciculiflorus** *Engl.*, Bot. Jahrb., XL, p. 550 (1908).

*Arbuste* ou petit arbre à rameaux jeunes brièvement velus et à rameaux adultes glabres. *Feuilles* pétiolées à pétiole pubescent de 5-12 mm. de long ; limbe chartacé, oblong-lancéolé ou oblong-oblancéolé, cunéiforme aigu ou rarement obtus à la base, acuminé-aigu ou obtus au sommet, denticulé ou parfois ondulé sur les bords, de 6.5-25 cm. de long et de 3-9 cm. de large, glabre à la face supérieure, éparsément pubescent sur les nervures à la face inférieure, nervures latérales 7-8 paires fortement imprimées à la face supérieure et très en relief à la face inférieure, nervation secondaire très apparente à la face inférieure ; stipules lancéolées, glabres, de 1 cm. de long et de 3-4 mm. de large. *Fleurs* (fig. 53) jaunes, fasciculées, de

Fig. 53. — *Lasiodiscus fasciculiflorus* Engl. : fleur (× 8).

4 à 20 à l'aisselle des feuilles, fascicules pédonculés, à pédoncule de 2-7 mm. de long brièvement velu-tomenteux ; bractées ovales de 4-5 mm. de long et de 3-4 mm. de large, velues-hirsutes ; pédicelles de 5-7 mm. de long, brièvement velus-tomenteux ; sépales ovales-triangulaires de 2-2.5 mm. de long et 1.5-2 mm. de large, charnus, tomenteux à la face externe, carénés à la face interne ; pétales cuculliformes de 1.5 mm. de long et de 0.5 mm. de large ; disque glabre de 3 mm. de diamètre ; ovaire velu, style de 1 mm. de long à parties libres de 0.5 mm. de long. *Fruits* sphéroïdes, aplatis aux 2 pôles, de 10-12 mm. de diamètre, jaunes tomenteux.

District Forestier Central : entre Libenge et Zongo, forêt de Sekia, 1930, *Lebrun* 1704 ; forêt de l'Urega, 830 m. d'alt., 1932, *Lebrun* 5722 ; Yangambi, forêt primitive ombrophile, 1937, *Louis* 5838 ; id., arbuste de 4 m. de haut, bois crème, dense à grain très fin, 1937, *Louis* 6112, 6554, 8436, 8634, 9161, 9236, 10899 et 11315.

*Nom indigène :* Lifumo la beoka (dial. Turumbu, fide *Louis*).

*Observations.* — 1. — Cette espèce est nouvelle pour le Congo belge ; elle est connue au Cameroun, au Sierra Leone et à la Côte d'Ivoire.

2. — Comme son nom l'indique, elle se caractérise par ses fleurs fasciculées à l'aisselle des feuilles.

3. **Lasiodiscus Mildbraedii** *Engl.*, Bot. Jahrb., XL, p. 552 (1908) : *Mildbraed*, Wiss. Erg. Deutsch. Zentr.-Afr.-Exp., 1907-08, Bot., II, p. 489 (1912).

*L. Chevalieri* Hutch., Bull. Soc. Bot. France, LVIII, p. 224 (1912).

*Arbuste* ou petit arbre à rameaux jeunes brièvement velus et à rameaux adultes glabres. *Feuilles* pétiolées à pétiole pubescent ou glabrescent de ± 5 mm. de long ; limbe chartacé, oblong-lancéolé,

Fig. 54. — *Lasiodiscus Mildbraedii* Engl. : fleur (× 8).

rétréci et dyssymétriquement arrondi à la base, acuminé-obtus au sommet ,denté sur les bords, de 6-18 cm. de long et 3-7 cm. de large, glabre sur les 2 faces, nervures latérales 8-10 paires très proéminentes à la face inférieure, nervation secondaire proéminente à la face inférieure ; stipules lancéolées, glabres, de 1 cm. de long et de 2-4 mm. de large. *Fleurs* (fig. 54) blanches disposées en cymes

bipares à 1, 2 ou au maximum 3 bifurcations dichotomiques régulières atteignant de 3 à 10 cm. de long et de 2.5 à 9 cm. de large; rameaux velus-hirsutes ou glabrescents; bractées lancéolées de ± 7 mm. de long et de ± 4 mm. de large; pédicelles grêles, de 10-20 mm. de long, velus ou glabrescents; sépales paraissant membraneux sur le matériel sec, triangulaires de 3-3.5 mm. de long et de 2-2.5 mm. de large, glabrescents ou velus à la face externe, glabres et à carène membraneuse à la face interne; pétales oblongs, spatuliformes, de 2.5 mm. de long et de 0.5 mm. de large; disque glabre de 3 mm. de diamètre; ovaire glabre, style de 2 mm. de long à parties libres de 0.5 mm. ordinairement réfractées. *Fruits* sphérioïdes, aplatis aux 2 pôles, de 10-14 mm. de diamètre, jaunes tomenteux.

District Forestier Central : Irumu-Mawambi, 1908, *Mildbraed* 2860, 2925 et 2927 (Herb. Berol.) ; Eala-Injolo, 1908, *Seret* 932; entre Penghe et Irumu, arbuste, 1914, *Bequaert* 2584; Kifuku-Irumu, 1914, *Bequaert* 2699; Lesse, bords marécageux et boisés de la Semliki, 1914, *Bequaert* 3144 et 3152; entre Libenge et Zongo, forêt-galerie, 1930, *Lebrun* 1687; entre Libenge et Gemena, galerie forestière, 1930, *Lebrun* 1787 et 1812.

*Observations.* — 1. — Cette espèce semble assez rare au Congo, alors qu'elle est signalée comme assez commune à la Côte d'Ivoire et à la Côte d'Or.

2. — Nous n'avons pas hésité à mettre *L. Chevalieri* en synonymie en comparant les descriptions et certains matériaux authentifiés.

4. **Lasiodiscus Mannii** *Hook.* f. in *Benth.* et *Hook* f., Gen. Pl., I, p. 381 (1863).

*Arbuste* ou petit arbre à rameaux jeunes velus et à rameaux adultes glabres. *Feuilles* pétiolées à pétiole velu de 10-12 mm. de long; limbe papyracé, elliptique ou oblong-ovale, obtus ou arrondi mais non dyssymétrique à la base, acuminé-obtus au sommet, ondulé sur les bords, de 10-35 cm. de long et de 4-17 cm. de large, glabre à la face supérieure, pubescent ou éparsément pubescent sur les nervures à la face inférieure, nervures latérales 7-9 très proéminentes à la face inférieure, nervation secondaire proéminente à la face inférieure; stipules lancéolées, glabres, de 1 cm. de long et

de 3 mm. de large. *Fleurs* (fig. 55) blanches disposées en cymes bipares à 4, 5 ou 6 rarement 3 bifurcations dichotomiques régulières, atteignant de 4 à 23 cm. de long et de 4 à 15 cm. de large; rameaux gris-jaune tomenteux; bractées lancéolées de 7-8 mm. de long et de ± 4 mm. de large; pédicelles gris-jaune tomenteux de 3-5 mm. de long; sépales charnus, triangulaires, de 2 mm. de long

Fig. 55. — *Lasiodiscus Mannii* Hook. f. : fleur (× 8).

et de 1.5 mm. de large, gris-jaune tomenteux à la face externe, glabres et à carène charnue à la face interne, réfractés et constituant une cupule par le bourrelet de la partie réfractée; pétales cuculliformes, de 1.5 mm. de long et de 0.75 mm. de large; disque glabre de 3 mm. de diamètre; ovaire velu à la naissance du style, style de 0.5-1 mm. de long à parties libres de 0.25-0.5 mm. de long non réfractées.

District du Kasaï : Goa, 1926, *Vandcryst* 19122.

District Forestier Central : environs de Likimi, marais, 1910, *Malchair* 74; Dundusana, marais, 1913, *Mortchan* 887; Likimi, marais, 1913, *De Giorgi* 198; Gemena, 1924, *Goossens* 4844; Bokatola, forêt marécageuse, 1930, *Lebrun* 1363; Yangambi, forêt primitive de vallée, 1936, *Louis* 1632, 1836, 9951; id., forêt secondaire marécageuse, 1938, *Louis* 9501.

*Noms indigènes :* Mobeleke (fide *Malchair*); Efwa (fide *De Giorgi*); Lifumo li Bowka ou Lifumo li Beoka (dial. Turumbu, fide *Louis*).

*Observations.* — 1. — Cette espèce est très répandue dans la forêt guinéenne ; au Congo elle semble localisée aux forêts marécageuses, tandis que le *L. fasciculiflorus* est une espèce de forêts sèches.

2. — Elle est très reconnaissable à ses grandes feuilles, à ses grandes inflorescences et à ses petites fleurs dont le style est à peine visible ; tandis que le *L. Mildbraedii* a des feuilles et des inflorescences beaucoup plus petites mais possède des fleurs relativement beaucoup plus grandes et à style toujours très proéminent.

## Species excludenda.

**Lasiodiscus Sereti** *De Wild.*, Bull. Jard. Bot. État, Brux., III, p. 271 (1911) = **Iodes Laurentii** *De Wild.*, Miss. É. Laurent, I, p. 381 (1907).

## Tribu 4. — GOUANIEAE.

### 8. — HELINUS *E. Mey.*

Arbrisseau sarmenteux pourvu de vrilles. Feuilles alternes, penninerves. Stipules petites caduques. Fleurs en ombelles. Calice à 5 lobes étalés. Pétales 5 cuculliformes. Étamines 5. Disque épigyne pentagonal. Ovaire infère à 3 loges ; style 3-fide. Capsule globuleuse, 3-coccée ; coques monospermes indéhiscentes se séparant les unes des autres à partir de l'axe 3-partite.

Les espèces de ce genre sont principalement fréquentes en Afrique tropicale, une seule est asiatique.

## Clef des espèces congolaises.

I. Fleurs glabres ; fruits lisses ... ... ... ... ... ... ... 1. *H. scandens.*

II. Fleurs densément pubescentes ; fruits réticulés... 2. *H. mystacinus.*

## Description des espèces.

1. **Helinus scandens** (*Eckl.* et *Zeyh.*) *Radlk.* ex *Weberbauer* in *Engl.* et *Prantl,* Pflanzenfam., III, 5, p. 426 (1896).

*H. ovatus* E. Mey in Harv. et Sond., Fl. Cap., I, p. 479 (1860) ; De Wild., Contr. Fl. Kat., p. 120 (1921).

*Arbrisseau* sarmenteux à rameaux glabres à l'état adulte et pourvus de vrilles glabres. *Feuilles* pétiolées, à pétiole pubescent ou

glabre de 7-20 mm. de long ; limbe membraneux, ovale, arrondi ou cordé à la base, obtus et mucronulé au sommet, entier sur les bords, de 1.5-4 cm. de long et de 1-3.5 cm. de large, glabre à la face supérieure, éparsément pubescent sur les nervures à la face inférieure, 3 nervures basilaires et 4 paires de nervures latérales visibles sur les 2 faces, nervation secondaire apparente sur la face supérieure ; stipules glabres, linéaires subulées de ± 5 mm. de long et de 0.5 mm. de large. *Fleurs* (fig. 56) disposées en ombelles multiflores

Fig. 56. — *Helinus scandens* (Eckl. et Zeyh.) Radlk. : fleur (× 8) ; fruit (× 3).

longuement pédonculées, à pédoncule glabre de 1.5-2.5 cm. de long ; pédicelle glabre de 7-10 mm. de long ; bractées subulées de 2-4 mm. de long ; calice glabre à dents triangulaires de 2 mm. de long et de 1.5 mm. de large ; pétales cucullés de ± 1.5 mm. de long ; disque glabre de 2.5 mm. de diamètre formant un cratère à bords relevés autour du style ; ovaire glabre, style de 2 mm. à parties libres réfractées de 1 mm. de long. *Fruits* (fig. 56)) glabres et lisses, obovoïdes, de 5-6 mm. de diamètre.

District du Bas-Congo : Matadi, pic Cambier, 1932, *Dacremont* 441.

District du Haut-Katanga : Élisabethville, *Rogers* (Herb. Brit. Mus.).

*Observation.* — Cette espèce paraît être très rare au Congo belge. Son aire de dispersion s'étend du Cap à l'Angola et au Tanganyika Territory.

2. **Helinus mystacinus** *E. Mey* ex *Steud.*, Nom. Bot., éd. 2, I, p. 742 (1840) ; *Hemsl.*, Fl. Trop. Afr., I, p. 385 (1868) ; *Engl.* in *Mildbr.*, Wiss. Erg. Deutsch. Zentr.-Afr.-Exp., 1907-08, Bot., II, p. 490 (1912) ; *R. E. Fries*, Wiss. Erg. Schwed. Rhod.-Kongo Exp., 1911-12, I, p. 133 (1914).

*Arbrisseau* sarmenteux à rameaux pubescents pourvus de vrilles velues. *Feuilles* pétiolées à pétiole velu de 5-15 mm. de long ; limbe membraneux, ovale, arrondi ou cordé à la base, obtus et mucronulé au sommet, entier ou denticulé sur les bords, de 1.5-5 cm. de long et de 1-4 cm. de large, glabre à la face supérieure, velu ou pubescent à la face inférieure, 3 nervures basilaires et 4 paires de nervures latérales visibles sur les 2 faces ; stipules velues, linéaires subulées de ± 5 mm. de long et de 0.5 mm. de large. *Fleurs* (fig. 57)

Fig. 57. — *Helinus mystacinus* E. Mey : fleur (× 8) ; fruit × 3).

disposées en ombelles multiflores longuement pédonculées, à pédoncule velu de 1.5-2.5 cm. de long ; pédicelle velu de 7-10 mm. de long ; bractées subulées de 2-4 mm. de long ; calice densément pubescent à dents triangulaires de 1.5 mm. de long et de 2 mm. de base ; pétales cucullés de ± 1 mm. de long ; disque glabre de 2 mm. de diamètre formant un cratère à bords non relevés autour du style ; ovaire glabre, style de 0.5 mm. à divisions dressées. *Fruits* (fig. 57) pubescents et rugueux, obsphéroïdes, de 5-6 mm. de diamètre.

District des Lacs Édouard et Kivu : île Idjwi, 1928, *Scactta* 962 ; plaines de lave entre les lacs Édouard et Kivu, vers 1,500 m. d'alt., 1929, *Humbert* 7874 ; Sake, 1932, *Lebrun* 5005 ; Rutshuru,

1937, *Ghesquière* 3947 ; id., 1937, *Lebrun* 8267, 8980 et 8989 ; lac Muguga, 1937, *Lebrun* 8847 ; Kasindi, 1912, *R. E. Fries* 1876 (Herb. Upps.) ; Katana, 1934, *De Wulf* 80.

District du Ruanda-Urundi : Nyavarongo, 1907, *Mildbraed* 687 (Herb. Berol.) ; entre Usumbura et Isare, vers 1,200 m. d'alt., 1926, *Robyns* 2272 ; entre Bukeye et Muremera, vers 1,800 m. d'alt., 1926, *Robyns* 2334 ; Kisenyi, plaine de lave, 1926, *Robyns* 2472.

*Observations.* — 1. — Cette espèce n'est pas comme la précédente une espèce du Sud de l'Afrique ; elle est nettement orientale, localisée qu'elle est en Erythrée, Somalie, Abyssinie, Kenya, Uganda, Kivu, Tanganyika Territory.

2. — Les deux espèces sont très voisines l'une de l'autre ; mais l'examen des fleurs et des fruits permet de les différencier très facilement.

### 9. — GOUANIA *L.*

Liane ligneuse pourvue de vrilles. Feuilles alternes, penninerves. Stipules petites caduques. Fleurs en racèmes axillaires ou terminaux. Calice à 5 lobes étalés. Pétales 5 cuculliformes. Étamines 5, cachées sous la coiffe des pétales. Disque épigyne pentalobé ou pentagonal. Ovaire infère à 3 loges ; style 3-fide. Capsule 3-ailée et 3-coccée ; coques monospermes ligneuses, indéhiscentes se séparant les unes des autres à partir de l'axe 6-partite.

La grande majorité des espèces de ce genre est américaine ; deux seulement ont été signalées au Congo belge

#### Clef des espèces congolaises.

1. Feuilles glabres ou uniquement pubescentes sur les nervures primaires à la face inférieure ; fleurs à pétales beaucoup plus longs que les sépales ; disque non lobé ... ... ... ... ... ... ... ... 1. *G. longipetala.*
2. Feuilles tomenteuses à la face inférieure ; fleurs à pétales de même longueur que les sépales ; disque lobé... ... ... ... ... ... ... ... ... ... ... ... ... 2. *G. longispicata.*

## Description des espèces.

1. **Gouania longipetala** *Hemsl.*, Fl. Trop. Afr., I, p. 383 (1868) ; *Th.* et *Hél. Dur.*, Syll., 1909, p. 104 ; *De Wild.*, Cie Kasaï, 1910, p. 345 ; *De Wild.*, Bull. Jard. Bot. État, Brux., IV, p. 165 (1914) ; id., V, p. 332 (1919) ; *De Wild.*, Mission de Briey, 1910, p. 250 ; *De Wild.*, Pl. Bequaert., I, p. 240 (1922) ; id., II, p. 81 (1923) ; *Green*, Kew. Bull., 1916, p. 198 ; *Mildbraed*, Wiss. Erg. Zweit. Deutsch. Zentr.-Afr.-Exp., 1910-11, II, Bot., p. 33 (1922).

*Liane* ligneuse pourvue de vrilles en crosse, à rameaux jeunes bruns-pubescents et à rameaux adultes glabrescents. *Feuilles* (fig. 58) coriaces pétiolées, à pétiole brun-pubescent ou glabre de

Fig. 58. — *Gouania longipetala* Hemsl. : rameau feuillu (× 1).

0.5-3 cm. de long ; limbe ovale, arrondi ou cordé à la base, acuminé, obtus ou aigu au sommet, denté sur les bords, de 3.5-9 cm. de long et de 2-6 cm. de large, glabre à la face supérieure, brun pubescent ou glabrescent sur les nervures primaires à la face inférieure, 3-5 nervures basilaires et 2-3 paires de nervures latérales très proé-

minentes à la face inférieure ; nervures secondaires visibles à la face inférieure et glabres ; stipules triangulaires de 1.5-2 mm. de long, pubescentes à la face extérieure. *Fleurs* (fig. 59) fasciculées sur de longs racèmes, disposés eux-mêmes en panicules amples au sommet des rameaux ; racèmes de 12-25 cm. de long à rachis brun-pubescent ; pédicelles de 2-4 mm. de long, bruns-pubescents ; bractées triangulaires de 1.5 mm. de long, pubescentes à la face externe ; calice infundibuliforme de ± 3 mm. de long, pubescent ou glabrescent, à lobes triangulaires de 1 mm. de long et de 1 mm. de large ; pétales cucullés de 2.5 mm. de long et de ± 1 mm. de large ; disque non lobé

Fig. 59. — *Gouania longipetala* Hemsl. : fleur (× 8) ; fruit (× 3).

glabre de ± 1 mm. de large ; ovaire glabre, style de 3.5 mm. de long à parties réfractées de 0.5 mm. de long. *Fruits* (fig. 59) ailés de 8-10 mm. de long et de ± 7 mm. de large.

District du Mayombe : sine loco, 1913, *de Briey*.

District du Bas-Congo : Kisantu, 1900, *Gillet* 888, 1039, 1266, 2913 ; vallée de la Djuma, 1902, *Gentil ;* vallée de la Nyanga, 1908, *Vanderyst ;* Lemfu, 1911, *Vanderyst ;* Lamba, 1913, *Verschueren* 603 ; Kisantu, 1921, *Vanderyst* 10213 ; id., 1925, *Robyns* 236 ; Mpese, 1926, *Vanderyst* 17696 ; Sona-Mbata, 1930, *Vanderyst* 25114 ; Kisantu, 1932-33, *Vanderyst* 30424, 31855, 32414, 32903, 32961, 32980 et 40642.

District du Kasaï : Lubue-Ipamu, 1899, *Luja* 285 ; Kongo-Kwilu, 1906, *Sapin ;* Hemptinne-St-Benoît, 1911, *Callewaert ;* Imese, 1912, *Sapin ;* Ipamu, 1921, *Vanderyst* 9264 et 9606 ; Kasongo-Lunda, 1925, *Vanderyst* 16098 ; Panzi, 1925, *Vanderyst* 17286 ; dans la

Benga, 1925, *Vanderyst* 14991 ; Goa, 1926, *Vanderyst* 19065 ; Thielen-St-Jacques, 1930, *Vanderyst* 21930, 23006 et 23370.

District du Bas-Katanga : Kapanga, 1934, *Overlaet* 1288 ; Nyangwe, 1896, *Dewèvre* 930.

District Forestier Central : Équateur, 1896, *Dewèvre* 560 ; Eala, 1905, *M. Laurent* 1098, 1113 et 1243 ; Limbutu, 1906, *M. Laurent* 1884 ; Mapusi 1905, *Seret* 391 ; Baringa-Yala, 1906, *Bruncel* ; Lukolela, 1906, *Pynaert* 260 ; Eala, 1906, *Pynaert* 656, 928, 1319 et 1786 ; Mogandjo, 1910, *Claessens* 666 ; Likimi, 1910, *Malchair* 455 ; Nala, 1911, *Boone* 65 ; Bongo s/Ubangi et Motenge s/Ubangi, 1912, *Sapin ;* Mobwasa, 1913, *Rcygaert* 1050, 1072, 1215, 1236 et 1354 ; Musa, 1913, *De Giorgi* 1199 ; Likimi, 1913, *De Giorgi* 1523 ; id., 1913, *Lemaire* 161 ; Yambata, 1913, *Montchal* 159 ; Dundusana, 1913, *Mortehan* 671 et 729 ; Banalia, 1913, *Bequaert* 1449 ; Lubutu-Kirundu, 1915, *Bequaert* 6812 ; Eala, 1914, *Nannan* 20 ; Boteke-Flandria, 1921, *Goossens* 2743 ; Lisala, 1925, *Robyns* 975 et 1099 ; Coquilhatville, 1930, *Lebrun* 637 ; Eala, 1930, *Stancr* 1581 ; id., 1935, *Leemans* 367 ; riv. Tshuapa, 1933-37, *Dubois* 182, 507 et 896 ; Yangambi, 1936, *Louis* 1237, 1245, 1850 ; Eala, 1936, *Louis* 2050 ; Yangambi, 1937, *Louis* 6507, 7106, 11147 et 12671 ; la Kulu, 1932, *Vanden Brande* 284 et 317 ; Bumba, 1910, *Mildbraed* 4294 (Herb. Berol.).

District du Haut-Ubangi et Uele : Bondo, 1934, *Dewulf* 304 ; Bambesa, 1933, *Brédo* 625 et 749.

*Noms vernaculaires :* Bisako (dial. Kundu, fide *Louis*) ; Bosangu (Eala, fide *Nannan*) ; Bayenge (dial. Turumbu, fide *Louis*) ; Bongenge (id.) ; Ketendola (Kasongo, fide *Dewèvre*) ; Litu (Magandjo, fide *Claessens*) ; Mosimbi (Likimi, fide *Malchair*) ; Mbaga (Zande fide *Boone*) ; Puku-puku (Ikwangula, fide *Dewèvre*) ; Itandjamoko i Boliki (dial. Turumbu, fide *Louis*) ; Vanda-makola (Tanganika, fide *Dewèvre*).

*Observations.* — 1. — Cette espèce est très répandue dans toute l'Afrique tropicale occidentale.

2. — Ce *Gouania* est la seule Rhamnacée congolaise ayant les pétales plus longs que les sépales et un style largement exsert.

2. **Gouania longispicata** *Engl.*, Pflanzenw. Ost.-Afr., C, p. 256 (1895) ; *Engl.* in *Mildbr.*, Wiss. Erg. Deutsch. Zentr.-Afr.-Exp., 1907-08, Bot., II, p. 490 (1912) ; *Green*, l. c., p. 198.

*G. Sereti* De Wild., Ann. Mus. Cgo, série 5, II, p. 45 (1907) ; Th. et Hel. Dur., Syll., 1909, p. 104 ; De Wild., Pl. Bequaert. II, p. 81 (1923).

*Liane* ligneuse pourvue de vrilles en crosse, à rameaux jeunes bruns pubescents et à rameaux adultes glabrescents. *Feuilles* (fig. 60) coriaces pétiolées, à pétiole tomenteux ou pubescent de 1-2.5 cm. de long ; limbe ovale, arrondi ou cordé à la base, aigu, acuminé aigu ou acuminé obtus au sommet, denté sur les bords, de 2-9 cm. de long et de 1-7 cm. de large, glabre à la face supérieure,

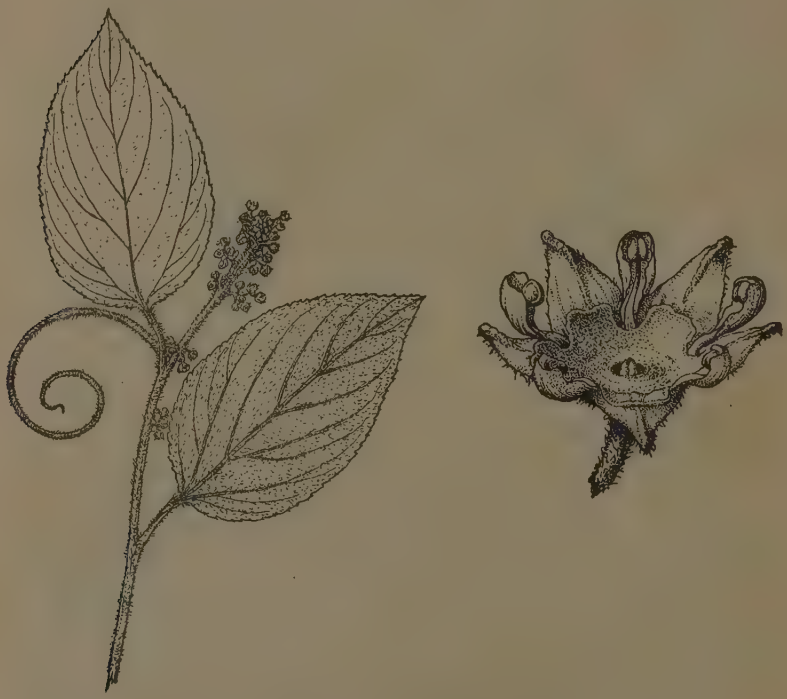

Fig. 60. — *Gouania longispicata* Engl. : rameau feuillu (× 1) ; fleur (× 8).

tomenteux à la face inférieure, 3-5 nervures basilaires et 4-6 paires de nervures latérales, très proéminentes à la face inférieure, de même que les nervures secondaires ; stipules oblongues-ovales ou linéaires, tomenteuses sur les 2 faces, de 5-7 mm. de long

et de 1-3 mm. de large. *Fleurs* (fig. 60) fasciculées sur de longs racèmes, disposés eux-mêmes en panicules amples au sommet des rameaux; racèmes de 9-15 cm. de long à rachis pubescent; pédicelles de 2-4 mm. de long, pubescents; bractées oblongues-ovales de ± 7 mm. de long et de ± 3 mm. de large, tomenteuses sur les 2 faces; calice cupuliforme de ± 3 mm. de long, pubescent à la face externe, à lobes triangulaires de ± 1.5 mm. de long et de ± 1.5 mm. de large; pétales cucullés de ± 1.5 mm. de long; disque glabre de 3 mm. de diamètre, pentalobé, à lobes échancrés au sommet, glabres, de 0.5 mm. de long; ovaire glabre, style de 0.5 mm. de long à parties libres non réfractées. *Fruits* ailés, de 8-10 mm. de long et de 8-10 mm. de large, hirsutes ou glabrescents.

District du Haut-Ubangi et Uele: route Niangara-Gombari, 1906, *Seret* 448.

District du Lac Albert: Djugu, vers 1,780 m. d'alt., forêt, 1931, *Lebrun* 3917; entre Irumu et Mombasa, 1931, *Lebrun* 4112.

District des Lacs Édouard et Kivu : volcan Niragongo, vers 2,100 m. d'alt., 1907, *Mildbraed* 1421 *a* (Herb. Berol.); Rutshuru, 1914, *Bequaert* 6074; île Idjwi, vers 1,500 m. d'alt., 1929, *Humbert* 8387; entre Walikale et Kalehe, vers 1,350 m. d'alt., 1932, *Lebrun* 5318; Rutshuru, 1937, *Ghesquière* 4257; id., vers 1,250 m. d'alt., 1937, *Lebrun* 8988.

District du Ruanda-Urundi : entre Bukeye et Muremera, vers 1,800 m. d'alt., 1926, *Robyns* 2329.

*Nom vernaculaire:* Mobimba-furu (dial. Kirundi, fide *Robyns*).

*Observation.* — Cette espèce est proprement orientale; elle existe en effet au Kenya, Uganda, Tanganyika Territory, Nyassaland, Rhodésie et dans l'Est du Congo.

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# RHYNCHOSTEGIELLA TEESDALEI LIMPR. EN BELGIQUE

PAR

**F. DEMARET.**

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Au cours d'une herborisation dans les environs de Rochefort, le 14 avril 1939, nous avons eu la bonne fortune de mettre la main sur une mousse nouvelle pour la Belgique : *Rhynchostegiella Teesdalei* Limpr. (1).

Nous avons récolté cette mousse (n° 1952 E) dans la station suivante : Rochefort, grotte du Trou Maulin, sur une paroi calcaire surplombante à 135°, 11 m. à l'intérieur de la grotte dont l'entrée a 10 m. de largeur et 6 m. de hauteur. C'est un endroit très frais où la lumière est faible.

Dans la même station nous avons noté, en mélange avec *Rhynchostegiella Teesdalei, Mnium punctatum* L., *Amblystegium, Juratzkanum* Schpr., une forme rabougrie de *Fissidens adiantoides* Hedw. et *Radula complanata* (L.) Dmrt.

Dans sa flore cryptogamique, Delogne signale que *Rh. Teesdalei* est à rechercher et que ce qui lui a été indiqué en Belgique sous ce nom appartient à *Rh. curvineta*. Mais comme il n'a vu de cette dernière espèce que 2 spécimens, nous avons jugé nécessaire de revoir tous les échantillons d'herbier déterminés sous les 2 noms.

(1) Nous remercions chaleureusement M. Ch. Meylan qui a bien voulu revoir la détermination de cette espèce et qui ne cesse de nous prodiguer ses conseils éclairés.

Ils appartiennent tous au *Rh. curviseta:* Anseremme, pied des arbres, juin 1890, Troch; Freyr (Namur), rochers ombragés, 10 août 1874, Gravet; ceux qui suivent étaient erronément dénommés *Rh. Teesdalei:* Dinant, 13 nov. 1873, Delogne; Anseremme (Namur), sur les rochers calcaires humides, 1872, Gravet n° 142; Strijpen (Sottegem), moulin à eau, mars 1874, De Keyser.

*Rh. curviseta* est aussi signalé à Hastière-Lavaux, Fonds-de-Leffe et à Rouillon, mais nous n'avons pas trouvé les échantillons correspondants.

La confusion dans la détermination de ces deux espèces provient de leur grande ressemblance. Ce sont toutes deux des plantes petites formant des touffes compactes d'un vert foncé, à tige très grêle, couchée, à rameaux courts dressés ou étalés, portant des feuilles dressées étalées assez espacées, petites et lancéolées.

Le *Rh. Teesdalei* diffère du *Rh. curviseta* par ses feuilles plus larges dans la partie supérieure formée de cellules plus courtes, à parois épaisses et munies d'une nervure plus apparente prolongée jusque près du sommet.

Chez les échantillons que nous avons examinés, le caractère tiré de la forme des cellules (plus courtes et à parois plus épaisses chez *Rh. Teesdalei* que chez *Rh. curviseta*) nous a paru très variable.

C'est uniquement la longue et forte nervure se prolongeant jusque dans l'acumen large qui nous a fait rapporter avec sûreté notre plante au *Rh. Teesdalei.* Mais, d'après Dixon (2), les caractères séparant les 2 espèces sont très variables. M. Ch. Meylan nous signale aussi que le tissu cellulaire de l'acumen, formé de cellules plus courtes chez *Rh. Teesdalei* que chez *Rh. curviseta,* est un caractère sans grande valeur, puisqu'il dépend de la forme de cet acumen; dans la même touffe récoltée par lui dans le Jura, la nervure des feuilles atteint toutes les longueurs possibles. Ces constatations ont amené M. Ch. Meylan à considérer *Rh. curviseta* comme une variété de *Rh. Teesdalei* plus ancien : « Le *Rh. Teesdalei* ne diffère en définitive que fort peu du *Rh. curviseta* et cette différence se compose plutôt d'une somme de petits caractères plus ou moins bien marqués et pas toujours très constants » (3).

D'après Limprecht (4), les feuilles périchétiales internes de

(2) Dixon. — *The Student's Handbook of British Mosses,* 1924.

(3) Ch. Meylan in J. Amann. — *Flore des Mousses de la Suisse,* II, p. 323 (1912).

(3) G. Limprecht. — *Die Laubmoose Deutschlands, Oesterreichs und der Schweiz,* III, pp. 213 et 218 (1904).

*Rh. Teesdalei* ne dépassent guère la longueur de la vaginule, alors que chez *Rh. curviseta* ces feuilles sont deux fois plus longues. Ce caractère est lui aussi sujet à de nombreuses variations. Nous en avons fait la constatation sur les spécimens de l'herbier belge et de l'herbier général du Jardin Botanique de l'État et en particulier sur notre plante de Rochefort, où les feuilles périchétiales dépassent longuement la vaginule.

Il n'existe aucun caractère motivant une séparation spécifique bien nette entre *Rh. curviseta* et *Rh. Teesdalei*.

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